CLEARINGHOUSE

# PROFESSIONAL STANDARDS REVIEW ORGANIZATIONS (PSRO)

*edited by*

BARRY DECKER, M. D. AND PAUL BONNER

Arthur D. Little, Inc.

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The materials in this book were developed by Arthur D. Little, Inc. and financed by the Community Health Service, Health Services and Mental Health Administration (Contract HSM 110-72-325). The Bibliography and State-of-the-Art papers were also financed by the National Center for Health Services Research and Development (Contract HSM 110-72-269). The findings and conclusions do not necessarily represent the views of the supporting governmental agencies.

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This book is dedicated to our wives, Wanita and Pat, who sacrificed their conjugal rights and privileges for its completion.

## TABLE OF CONTENTS

Page

PART I

PL 92-603; THE BENNETT AMENDMENT 1

THE PERSPECTIVE OF PROFESSIONAL REVIEW 8

THE CONTENT OF PEER REVIEW 14

THE APPLICATION OF PEER REVIEW TO PSRO 25

SPECIFIC PEER REVIEW PROGRAMS 32

PSRO DISTRICTING CONSIDERATIONS 55

PROFESSIONAL STANDARD REVIEW ORGANIZATIONS (PSRO) 64

PSRO STATE COUNCILS 72

THE NATIONAL PROGRAM 76

PART II

CERTIFICATION OF THE NEED FOR AND VOLUMETRIC APPRAISAL OF MEDICAL CARE
by Elaine Israel 85

COST CONTROL METHODS IN HEALTH CARE DELIVERY
by Stanley Werlin 132

QUALITY OF CARE ASSESSMENT
by Suzanne H. Kase, R.N. 174

OUTCOME APPRAISAL OF MEDICAL CARE
by Barry Decker, M.D. 191

DATA PROCESSING SYSTEMS FOR MEDICAL CARE APPRAISAL
by Paul A. Bonner 209

## TABLE OF CONTENTS (Cont.)

Page

PART III (APPENDIX)

APPENDIX A: RESTATEMENT OF THE BENNETT AMENDMENT (PL 92-603) 332

APPENDIX B: GLOSSARY OF SELECTED TERMS 340

APPENDIX C: BIBLIOGRAPHY 342

# PREFACE

The Community Health Service (CHS) commissioned Arthur D. Little, Inc., (ADL) to develop several conceptual models for the structure and function of prototype Professional Standards Review Organizations (PSRO) as described in the Social Security Amendments of 1972 (P.L. 92-603). The work was initiated during July 1972 under the terms of Contract HSM 110-72-325.

The present book is the result of these efforts. It has been published in the hope of providing resource information to the many persons and agencies now vitally interested in the development of Professional Standards Review Organizations.

The work was initially based upon a careful review of the pertinent literature and study of existing approaches to medical care appraisal. The bibliography and state-of-the-art papers which resulted are included in the present volume. These efforts were jointly funded by the above-mentioned contract with the Community Health Service and by a contract with the National Center for Health Services Research and Development (HSM 110-72-269). This latter contract called for an evaluation of Experimental Medical Care Review Organizations (EMCRO) and provided a pertinent opportunity to study eight current experimental prototypes of PSRO in greater depth. We were gratified by the symbiotic nature of these two contracts and the opportunity to help coordinate the two related, yet distinct, projects.

Our efforts required careful study of P.L. 92-603 and its periodic markups during passage through the Congress. A plain English restatement of this legislation has been included in the Appendix to this volume. We were directed, but not constrained, by the specific language of the legislation. We did consider approaches to peer review, which were not specifically identified in the bill, when we thought them both productive and consistent with the intent of the legislation; we specifically avoided those functional areas of review which were contraindicated by the terms of the legislation.

Both inductive and deductive methods were used in the analysis. Pertinent substantive concepts from the literature and our study of current peer review methods were organized in the form of discussional agenda. These materials were presented to and challenged by a panel of experts, including: Paul Bonner, Barry Decker, Jack Kasten, John Mannix, H. Richard Nesson, Russell Roth, and John Thompson. The specific disciplines and major experience of each panel member is summarized in the following grid.

| | DISCIPLINE | | | MAJOR EXPERIENCE | | | | |
|---|---|---|---|---|---|---|---|---|
| | Medicine | Law | Administration | Hospital and Medical Staff Administration | Ambulatory Care Administration | Fiscal Intermediaries and Claims Review | Hospital Abstract and Regional Health Data Systems | Organized Medicine |
| Paul Bonner | | | X | | X | | X | |
| Barry Decker | X | | | X | | | X | |
| Jack Kasten | | X | X | X | | | | |
| John Mannix | | | X | | | X | X | |
| H. Richard Nesson | X | | | X | X | | | |
| Russell Roth | X | | | | | | | X |
| John Thompson | | | X | X | | | X | |

Completion of the consulting work, and the preparation of this volume, was made possible by the devoted efforts of the panel members, who were able to successfully pool their experience and judgment and to rapidly function as a group without loss of individual input or perspective. The attitudes of the group varied from optimism for the ultimate value of the bill to a pessimistic belief that the legislation is unworkable. Tentative conclusions reached by analysis were summarized in draft form and reviewed by each member of the panel. Their comments and suggestions were incorporated in the final reports. While it is impossible to accommodate all shades of thought, we believe that the present volume accurately reflects the combined opinion of the panel and incorporates important individual dissent.

Sections of the bibliography and individual state-of-the-art papers were prepared by specific members of the ADL case team, as indicated in the text. These authors contributed significantly to the progress of the consultation and to the preparation of this volume.

All of us are deeply indebted to our project officers, Sheridan L. Weinstein, M.D. and Leonard J. Janchar, M.D. of the Community Health Service. In addition to financial support, they graciously gave their time, interest, advice, and frequently participated in the panel discussions.

We are also indebted to Miss Nancy Richardson and Mrs. Debbie Zucco. They are the unsung secretarial heroes who laboriously typed the components of this manuscript and faithfully met each and every deadline.

The work, which this volume describes, had a simple, inherent logic. It began with a literature review and study of existing approaches to peer review, followed sequentially by panel analysis of the guidelines, organizations, and relationships required to implement PSRO. These panel discussions were not uniquely directed towards the preparation of a consulting report; rather they wandered with fits and starts and with considerable reiteration. No effort has been made in the arrangement of the present volume to follow the exact chronology of the consulting work nor the specific detail of the panel discussions. In fact, we have reversed the order of development in the interest of what we believe to be a better presentation of the material.

Part I presents the substance of the panel's PSRO considerations. It begins with the origin, nature, and significance of the legislation followed by a description of the panel's perspectives for professional review. Part I then presents the content of peer review, its application to the functions of PSRO, and the details of individual peer review programs. The balance of Part I deals sequentially with PSRO districting, the organization and necessary relationships of PSRO's, State Councils, and the National Program.

Part II presents the state-of-the-art papers prepared by members of the case team. Since these papers helped the members of the panel to conduct the analysis, we have assumed they would have similar value for others interested in the development of PSRO's. For this reason, the papers have been included in the present text.

The Appendix to the present volume (Part III) provides the reader with additional resources pertinent to PSRO and peer review. We have included a simple restatement of the legislation (P.L. 92-603), a glossary of selected terms, and the bibliography on medical care appraisal, which we prepared.

The materials for this volume were developed between July 1972 and March 1973. P.L. 92-603 was signed into law late in 1972, perhaps one year earlier than any of us had expected. As a result, we worked under the pressure of mounting demands for useful products including descriptions of available guidelines and recommendations for regulations to implement PSRO. These time constraints required discussion of programs which have not yet been fully evaluated. We appreciate the need for further evaluation and look forward to rereading, and perhaps rewriting, this volume when better evidence concerning the impact of these programs becomes available.

Lacking documented impact evaluations, we had to stumble along, as best we could, with only prospective estimates to chart the best course. At times vision was clouded by the intensity of competing advocacy for conflicting but unproven methods. Nevertheless, if our efforts help others to walk the PSRO path a little more surely, our purpose will have been accomplished.

Cambridge, Massachusetts
April 1973

Barry Decker, M.D.

# PART I

# P.L. 92-603: THE BENNETT AMENDMENT

## P.L. 92-603: THE BENNETT AMENDMENT

P.L. 92-603 (the Bennett Amendment) is presented in its entirety in Appendix A. In the interests of simplicity, the original legislative language has been translated into plain English and the components of the legislation regrouped in functional rather than statutory categories.

### A. HISTORY OF THE LEGISLATION

The legislation originated with proposals by the American Medical Association (AMA) for the development of Peer Review Organizations (PRO) by State Medical Societies. This proposed mechanism for cost control was incorporated in the AMA's Medicredit Plan, which was introduced in the House on July 21, 1970 by Representatives Fulton and Broyhill under the title Health Insurance Assistance Act of 1970.[1]

As proposed, the Secretary of HEW would enter into agreements with State Medical Societies to establish Peer Review Organizations (PRO's). Each PRO would include a five member Commission and a nine member Advisory Council. Each PRO Commission would divide its State into administrative districts and appoint a three member local review panel and a five member local advisory council. The State PRO Commission and the local review panels would only include physicians. These panels were to review information supplied by individuals, institutions, hospitals, government agencies, and carriers as well as a random selection of cases for peer review. Where patterns of abuse were detected, the PRO could recommend to the Secretary suspension or exclusion from the program, and in the case of fraud, the PRO could bring charges before the appropriate licensing body.

The PRO proposals of the American Medical Associations were also submitted to Senator Wallace Bennett of Utah for possible introduction in the Senate.[2] Senator Bennett "forwarded the proposal to the Finance Committee staff for comment and analysis in terms of their experience with the medicare and medicaid programs and in the light of hearing and other review activities." According to Senator Bennett, the Finance Committee staff felt that:

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[1] Congressional Record-House, July 23, 1970.

[2] Congressional Record-Senate, July 1, 1970

> "the AMA plan was unduly limited and a number of suggestions, modifications, and extensions were recommended . . . . that the staff believed would reflect the attitude in their recent report on medicare and medicaid that: The key to making the present system workable and acceptable is the physician and his medical society".

In this same address, Senator Bennett indicated his intention to propose an amendment for Professional Standards Review Organizations (PSRO), based on the AMA draft proposals as modified by the suggestions of the Finance Committee staff.[1] The original PSRO Amendment was proposed shortly thereafter and is recorded in the Congressional Record-Senate of August 20, 1970.

The philosophic base of the PSRO Amendment is best expressed in the Senator's own words.[1]

> "I believe that physicians, properly organized and with a proper mandate, are capable of conducting an ongoing effective review program which would eliminate much of the present criticism of the profession and help enhance their stature as honorable men in an honorable vocation willing to undertake necessary and broad responsibility for overseeing professional functions. If medicine accepts this role and fulfills its responsibility, then the Government would not need to devote its energies and resources to this area of concern. Make no mistake: the direction of the House-passed social security bill is towards more- not less- review of the need for and quality of health care. I believe my amendment would provide the necessary means by which organized medicine could assume responsibility for that review.
>
> In my opinion, if ultimately enacted, the Professional Standards Review proposal now being drafted would provide physicians with an imaginative and exciting opportunity to assume basic responsibility for reviewing health care as a whole. It would scrap the piecemeal review activities of varying effectiveness which have prevailed since 1966."

The Senate Finance Committee approved a modified form of the Bennett Amendment (No. 851) to the pending social security bill during October, 1970. Final action on the bill, however, was not taken by the 91st Congress. The bill was reintroduced to the 92nd Congress as Amendment No. 823 to the Social Security Act (H.R.1) on January 25, 1972. It was referred to the Committee on Finance and ordered to be printed.

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[1] Congressional Record-Senate, July 1, 1970.

The bill was again modified before it was reported out by the Senate Finance Committee late in 1972. Section 1170 authorizing demonstration projects to test the feasibility and economies of prepayment through PSRO's was eliminated.

The Bennett Amendment, as modified by the Finance Committee, was passed by the Senate and referred to a House-Senate Conference Committee. As a result of that conference, the House receded (accepting the amendment) with the following modifications:[1]

(1) "Until January 1, 1976, the Secretary would be able to make an agreement only with a qualified organization which represents a substantial proportion of the physicians in the geographic area designated by the Secretary.

(2) A professional standards review organization would not be required to review other than institutional care and services unless such organization chooses to include the review of other services and the Secretary agrees.

(3) Until January 1, 1976, at the request of 10 percent or more of the practicing physicians in a geographic area designated by the Secretary, the Secretary would be required to poll the practicing physicians in the area as to whether or not an organization of physicians which has requested to conclude an agreement with the Secretary to establish a professional standards review organization in this area substantially represents the practicing physicians in that area. If more than 50 percent of the practicing physicians in the area responding to the poll indicate that the organization does not substantially represent the practicing physicians in the area, the Secretary could not enter into an agreement with that organization."

## B. MAJOR PROVISIONS OF P.L. 92-603

The legislation authorizes the Secretary of HEW to designate specific areas of the country by January 1, 1974, and to establish conditional contracts for a PSRO in each area as soon as possible thereafter. Prior to January 1, 1976, the Secretary may only contract with qualified organizations which represent a majority of the physicians in each area, who respond to polling. A qualified organization is a voluntary professional association, without requirement for dues, which represents 300 or more physicians.

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[1] Congressional Record-House, October 14, 1972.

State Councils are authorized in any State with three or more PSRO's to include representation from each PSRO in the State, other physicians, and the public. A National Council will be appointed by the Secretary, which will include eleven physicians, with a majority nominated by national physicians' organizations.

The PSRO's will monitor the appropriateness of utilization and the quality of institutional services provided to beneficiaries of the Social Security Act (i.e., Medicare and Medicaid). They will be concerned with the necessity for and quality of care, and with the use of an appropriate level of service, but will not be required to determine the reasonableness of individual charges. The use of cost data, however, as a surrogate for utilization, is not excluded by the legislation. With the concurrence of the Secretary, PSRO's have the option to monitor ambulatory services, as well.

PSRO's will utilize norms of care based, on typical patterns of practice in the region, to evaluate the appropriateness of utilization and the quality of institutional services. Regional norms must be approved by the National Council. Justification will be required for any regional norms which significantly deviate from national norms.

PSRO's are encouraged to use the services of many practicing physicians in the conduct of their reviews and to delegate responsibility for review to hospitals, HMO's, and other group practices which have demonstrated the capability to conduct adequate reviews. Within this framework, PSRO's are charged with the responsibility for:

- Precertification of institutional services,
- Periodic sample reviews by diagnosis or condition,
- Regular review of patient and provider profiles,
- Monitoring the certification requirements of SSA,
- Physician education concerning the program, and
- Appropriate reporting of violations.

The State Councils will coordinate and integrate the activities of the various PSRO's, serve as an appeal agent, and assist the Secretary in the conduct of the program.

The National Council will prepare, revise, and distribute regional norms, provide technical assistance in the use of these norms, review the performance of the State Councils and PSRO's, and advise both the Secretary and the Congress on the progress of the program.

PSRO's are authorized to undertake professional inquiry before and/or after the provision of any service covered by the legislation; to examine pertinent records; and to inspect physical facilities where such care is rendered. After proper notification, no Medicare or Medicaid claim will be paid if the service is subject to the review of a PSRO and has been disapproved. Each health care provider and practitioner is obligated to provide services consistent with the intent of the Amendment. Recurrent or flagrant violations may lead to exclusion from the program or a fine. An appeals route is defined for dissatisfied patients, practitioners, or providers.

The legislation provides for the transitional assumption of PSRO duties over a two-year conditional period and for the continuation of presently authorized reviews during the transition. Appropriate funding through the Hospital Insurance Trust Fund and the Supplementary Medical Trust Fund is provided for technical assistance and the reasonable and necessary expenses of PSRO's, State Councils, and the National Council.

## C. MAJOR OBJECTIVES OF THE LEGISLATION

The legislation is designed to utilize professional expertise through peer review, subject to public accountability, to assure the appropriateness and quality of institutional services purchased under provisions of the Social Security Act.

The explicit objectives of the legislation include review of the services provided all federal beneficiaries to evaluate the:

(1) necessity for institutional admission,

(2) duration of institutional service,

(3) appropriateness of the level of institutional care, and

(4) adequacy and relevance (quality) of the service provided.

The implied objectives of the legislation are to:

(1) contain the utilization, and thereby the cost, of federal health services, and at a minimum,

(2) assure that the services purchased are medically necessary and appropriate.

## D. THE ROLE OF P.L. 92-603 IN THE FEDERAL HEALTH STRATEGY

Federal health strategy, in the nineteen seventies, is dominated by two related concerns: (1) the imminence of national health insurance; and (2) the need to prevent inflationary pressures produced by augmented purchasing power, a shortage of medical professionals, and an excess of hospital beds.

Representative Richard Fulton of Tennessee, while introducing the AMA Medicredit Plan, inserted the following comment in the Congressional Record of July 21, 1970: "The idea of national health insurance is an idea whose time has come. The question is no longer whether or not we need a national insurance plan. The question is what plan? And when can we develop one that works?"

Whether any national health insurance plan works or not will depend, in good measure, on its ability to equitably distribute scarce medical resources. The failure of such rationing will lead to market competition and inflationary prices for medical services. It is true that a ceiling can be imposed, and possibly enforced, on unit medical prices. It is far more difficult, however, to control the over-utilization of services, and particularly the over-utilization of hospital services in the presence of empty hospital beds.

Federal strategy to counter the shortage of physicians has been based on: (1) stimulation of the number of medical graduates; (2) increased medical capacity through the use of physician expanders, such as physicians' assistants, nurse practitioners, and nurse clinicians; and (3) increased medical capacity through the use of automated diagnostic systems.

Federal strategy to counter the excess, and possible maldistribution, of hospital beds has been based on: (1) comprehensive area-wide health planning; and (2) elimination of Hill-Burton grants for hospital construction and renovation.

PSRO represents the federal strategy to equitably distribute medical resources. PSRO has been designed to assure, in the absence of price constraints, that the services provided are necessary, of adequate quality, and performed as economically as possible. In effect, PSRO is a form of non-price rationing which limits the use of scarce medical resources to those situations where they are most necessary and appropriate.

PSRO will have little impact if all the medical services now performed are necessary, of adequate quality, and performed in the most economic manner. If, as is likely, current medical services sometimes fail to meet these standards, PSRO may salvage resources and help the existing medical plant to better meet the demands it faces, without destructive inflation.

PSRO is then a managerial tool. It is a governmental plea for medical involvement in the effective and efficient distribution of medical services, in the absence of price constraints. It is a necessary precursor to the further public assumption of responsibility for the financing of health care. PSRO is organized medicine's opportunity for self regulation. Given the pressures which now exist for national health insurance, failure of PSRO may well initiate other, less workable, forms of bureaucratic control over the practice of medicine.

## THE PERSPECTIVE OF PROFESSIONAL REVIEW

The members of the consulting panel, who developed this report, were selected to provide specific skills. No member spoke officially for any organized segment of the health care community. Nevertheless, the prior experience and current positions of the panel members permitted a sensitive appreciation for the unique interests of such varied groups as physicians, hospitals, intermediaries, and the public.

Despite their diverse backgrounds, the consulting panel members shared certain common viewpoints concerning PSRO. These perceptions influenced the analysis of issues and determined most of the recommendations which were developed. It is appropriate therefore, to preface the substantive portions of this book with a brief orientation to the panel's perspective.

The consulting panel perceived significant differences between *claims review*, as it is normally conducted, and *professional review*. Since these terms do not always carry the same meaning to different people, reasonably precise definitions are necessary.

*Claims review* is a retrospective process which begins with the initiation of a claim for payment after the completion of a service. The claims process, from receipt to payment, usually includes:

- A check for the completion of all necessary items on the form;
- A determination that the beneficiary is indeed eligible and that the contract covers the services provided; and
- A check that charges are consistent with usual and customary individual fees or published institutional rates.

In most cases, claims review is limited to the activities described above, and is primarily designed to determine or verify the existence of a contractual obligation on the part of the intermediary to pay for the service billed.

Infrequently, an attempt is made during claims review, to evaluate the necessity for a billed service. This has been approached by individual case review or by comparison of statistical summaries describing the volumes or costs of care in specific categories. In the former case, individual lengths of stay or specific surgical procedures are screened by a reviewer in relation to the discharge diagnosis. Seemingly inappropriate relationships are presented to a medical consultant, or an expert panel, for judgmental review. The criteria for these comparisons may be implicit (the best opinion of the reviewers, consultants, or expert panels) or explicit (empiric norms for length of stay and normative criteria for quality of care). The statistical approach is based on aggregate utilization or cost data to describe discharges, days of care, or the use of specific services by individual physicians, particular departments, or entire institutions. These statistical summaries may be developed for all patients or for patients with specific diseases. Comparisons are made with prior time periods or with seemingly comparable institutions. Save for these infrequent approaches, the relevance or appropriateness of medical service is rarely evaluated by the usual claims review process. Evaluation of the quality of medical care is even less common in the usual claims review process.

*Professional review*, unlike claims review, may be prospective, concurrent, or retrospective. It is designed to evaluate both the quality and the economics of medical care. Professional review generally includes an evaluation of the:

- Relevance of individual services to each patient's specific needs, as determined by his diagnosis;
- Appropriateness of the level of care to each patient's particular medical needs;
- Volume of services provided in each instance;
- Appropriateness of the outcome, including complications, indications for discharge, and the provision of follow through services; and
- Appropriateness of the services provided to populations as a measure of the accuracy of diagnosis and the adequacy of case finding.

The input requirements for claims review include the initiating claim for payment, an eligibility file, and selected criteria. The latter are generally limited to usual and customary fee scales, institutional rate schedules, and empiric norms for length of stay by diagnosis. More sophisticated, but infrequent, programs may also require criteria which specify appropriate surgical procedures for each diagnosis. Sophisticated programs dealing with statistical summaries require stored data describing prior experience for comparison with current performance.

Professional review requires a much more detailed abstract of each case than does claims review. The abstract generally includes more diagnostic subspecifications and details of both the services provided and the volumes of care. Certain aspects of professional review also depend upon an aggregation of data to provide institutional or population based summaries.

In general claims review has an accounting emphasis while professional review has a medical emphasis. Claims review is necessarily retrospective and requires less detailed information than professional review. Claims review is oriented towards a pay, no pay decision. Professional review, while it may provide a pay, no pay decision, is oriented towards educational outputs which modify physician performance.

Some aspects of professional review can be, and have been, based upon data provided by claims review. Total professional review, however, cannot be performed with claims review data alone for the following reasons:

(1) Retrospective claims data do not permit the prospective or concurrent aspects of professional review;

(2) Claims review methods do not provide the educational output required for professional review;

(3) The data on claims forms are too limited and too inaccurate for most professional review.

For these reasons, *the panel understands professional standards review as related to, yet separate and distinct from, claims review.*

P.L. 92-603 mandates both claims review (reimbursement control) and professional review (education). The former promotes short-term impacts which influence federal expeditures; the latter promotes long-term impacts which influence national health care costs and the quality of medicine.

Reimbursement control can be achieved equally as well by combining professional review and claims review or by appropriately reporting the results of independent professional review to the intermediaries responsible for claims processing. Education leading to modified physician behavior, however, requires professional review activities and organizations which basically differ from the usual methods of claims review.

The panel recognized the dependence of some existing professional review models on the input of claims review data. This approach is most common in those sites or agencies dominated by fiscal or accounting concerns. Though claims forms currently provide the only source of data for the review of non-institutional, fee-for-service, ambulatory care, other and better data sources exist for the professional review of institutional care. The panel was aware of many models of professional review which do not depend upon the input of claims form data. Examples of such reviews include:

- Precertification based on the information in an application for admission;
- On-Site Concurrent Hospital Review based on the direct observations of a nurse coordinator; and
- Retrospective audits of hospital practice based on detailed discharge abstracts.

In consequence, while recognizing the need for reporting professional judgments to the claims processor, the panel sought alternatives to claims review as the basis for professional standards review. In the judgment of the consulting panel, such alternatives offer a better data base for professional review and a greater promise of educational impact. These perceptions are important to the subsequent analysis since, by implication, they free prototype PSRO's from exclusive dependence upon the existing organization for claims review.

*The panel perceived a necessary interdependence between the care provided federal beneficiaries and the balance of the private health delivery system.*

Legal constraints, public demands, and professional attitudes make it impossible to justify two standards of medical care in our contemporary society. The consulting panel understood P.L. 92-603 to mandate professional review only for the beneficiaries of the Social Security Act. More importantly, the panel appreciated that this restriction, except in terms of dollar support for the activity, is literally impossible.

The norms of care and most of the forms of professional audit, developed for federal beneficiaries under PSRO, will ultimately be applied to all private medical services. In addition to their inherent resistance to separating "federal care" from "medical care," as evidenced by the common extension of utilization review to private hospital care, physicians are aware of the public and legal pressures to extend PSRO norms and reviews to the entire private health delivery system.

This perception is important to the subsequent analysis of PSRO prototypes. Despite the legal limitations of P.L. 92-603, PSRO norms and audit methodologies must be applicable to private medical care and, therefore, acceptable to the private health delivery system. In consequence, PSRO's must be organized to accept inputs concerning private medical care and to produce outputs for providers and carriers dealing with private medical care. In brief, PSRO's must relate to and have data concerning the entire local health delivery system rather than the limited subset of data and relationships which serve Federal beneficiaries.

*The panel recognized two distinct, yet related, perspectives for the collection of review data; one dealing with the services provided to a specific individual and the other with an aggregate describing the performance of a provider or institution or the services rendered to a population.*

Review of individual cases is the classic approach to medical audit. Individual case review is also the classic method of claims review. This approach has the advantage of familiarity and, therefore, greater acceptance when properly performed. The disadvantage of this approach is the enormous volume of work associated with the review of a sample of significant size. Current efforts have been directed towards simplification of review, and reduction of workloads, by the automated comparison of voluminous performance data with explicit criteria.

Analysis of aggregated data is the classic tool of epidemiology and health service research, but is less familiar and less convincing to the average physician. Nevertheless, the chronologic aggregation of provider data in the form of patient and physician profiles for comparison with model practice patterns is gaining acceptance.

Physicians are also familiar with the use of aggregate institutional data to describe general or disease specific admission rates, length of stay, and various mortality or morbidity rates. Unfortunately, the impact derived from institutional comparisons, by these indices, is often minimized by the assertion or the reality of unique patient mixes or special service populations in different hospitals. Furthermore, though the patients admitted to each institution are known and catalogued, the population at risk, from which they were drawn, can only be estimated in most cases.

Aggregate data describing the health services received by specific populations has recently been popularized by prepaid groups where the population at risk is known and services per 100 members can be reported. These reports are inaccurate to the degree that subscribers seek unreimbursed services outside of the plan. Similar reports, but with less sophisticated detail, are generally developed by most insurance carriers per unit of population enrolled. These reports are similarly limited by unreported services not reimbursed by the intermediary. An essentially similar and more accurate approach can also be applied to the population of any geographic area if the service data from all the health providers and institutions are collected and resorted in relation to some population characteristic. These usages develop what has been called "population based" data as distinct from "institutional based" data. "Population based" data permit a comparison of different population groups, more or less readily adjusted for the unique demographic characteristics of each population group.

Individual case review and the review of aggregate data are not unrelated. Aggregate data is always developed by the summation of individual data. Criteria for individual review are usually derived, at least in part, from an analysis of aggregate data.

In the judgment of the consulting panel, individual case review and each of the forms of aggregate data review discussed above, have pertinence to specific facets of PSRO activity. The comparison of "population based" data, properly adjusted for variance in the populations, serves to monitor the performance of a region and indicate the presence of specific problems within the region. "Institutional based" data helps to identify the source of these problems. Individual case review, in those institutions, helps to further define both the source and the nature of the problem and may also serve as the educational tool to correct the problem. Aggregate provider data, in the form of patient and physician profiles, document the repetition and consequently the more serious nature of a problem.

The implications of these panel perceptions will become obvious in the ensuing pages. Briefly, the organizational requirements for PSRO must conform to the varied data needs and the different output routes implied by these perspectives for professional review.

# THE CONTENT OF PEER REVIEW

Peer review is a means to apply collective professional judgment to individual or group medical performance. The absence of simple criteria to measure the benefits of medical care, and the technical nature of medical practice, both emphasize the need for physician judgment to assess the necessity, appropriateness, and quality of medical services. In short, peer review is the only adequate and professionally acceptable means to accomplish a socially mandated review of medical practice.

Consultation and teaching or supervisory rounds are the oldest and simplest form of peer review. Such one-to-one review is generally concurrent, has a formative role in patient care, and depends upon the application of implicit criteria by a recognized expert. Within hospitals, the responsibility for peer review has been delegated to the medical staff, a particular service, its chief, or a designated committee. Collectivity has enlarged the scope of review and introduced retrospective methods geared to prospective educational solutions. Nevertheless, until recently, hospital peer review has also depended upon the application of implicit criteria by recognized experts.

The demands of large-scale medical care appraisal, however, and the parallel shortage of physicians for evaluation activities, generate new requirements for regional peer review.

(1) To process the volume of work, automated screening and professional review only of exceptions become necessary.

(2) To permit automation, and insure uniformity, it becomes necessary to define explicit criteria and select appropriate cases for study.

(3) To make large-scale regional review worthwhile, it becomes necessary to develop appropriate and effective educational or fiscal outputs which demonstrably modify future physician behavior.

In this section we will describe the components of such large-scale regional peer review. Before proceeding, however, attention is called to the glossary of selected terms which appears in Appendix B. The usages specified by this listing will be employed in the following discussion.

## A. MAJOR COMPONENTS OF PEER REVIEW

A schematized presentation of the major components of peer review is given in Figure 1. To expedite the discussion, these activities were divided into *inputs, process, outputs,* and *evaluation*. No single existing peer review program encompasses all of the activities outlined in this theoretical schema.

### 1. Inputs

The major inputs required for large-scale medical care appraisal include the development of explicit criteria and the selection of appropriate cases for review.

#### a. Criteria

Criteria explicitly identify the elements of medical care which characterize quality of care for each diagnosis or condition studied. Whether criteria are met or not, in an individual case, measures the quality of the care rendered. Criteria are most often selected normatively by consensus among local professional committees and, given the present state-of-the-art, dominantly relate to the processes of medical care. Most current criteria are optimal, describing the best practical care obtainable. In some cases minimal criteria have been used to instruct non-professional reviewers in the selection of cases for which professional review is mandatory.

Norms generally specify quantitative levels of performance. They are usually developed empirically, by measuring performance in a stated sample, but may be modified by deliberative judgment. Norms, commonly in use, deal with length of stay, frequency of visits, charges, and mortality rates. Selected norms may be optimal, average, or minimal or may describe the frequency distribution of a given event in a defined sample. Norms have been developed for both the processes and the outcomes of medical care.

Standards specify the degree of desired conformity between actual practice and explicit criteria or norms. Standards may alternately be set by measured compliance in a stated sample (empiric) or by deliberative professional judgment concerning what should exist (normative). The former method tends to emphasize average standards and the latter optimal standards. In most cases, both methods are used, one for initial selection and the other for validation, yielding standards which fall between average and optimal.

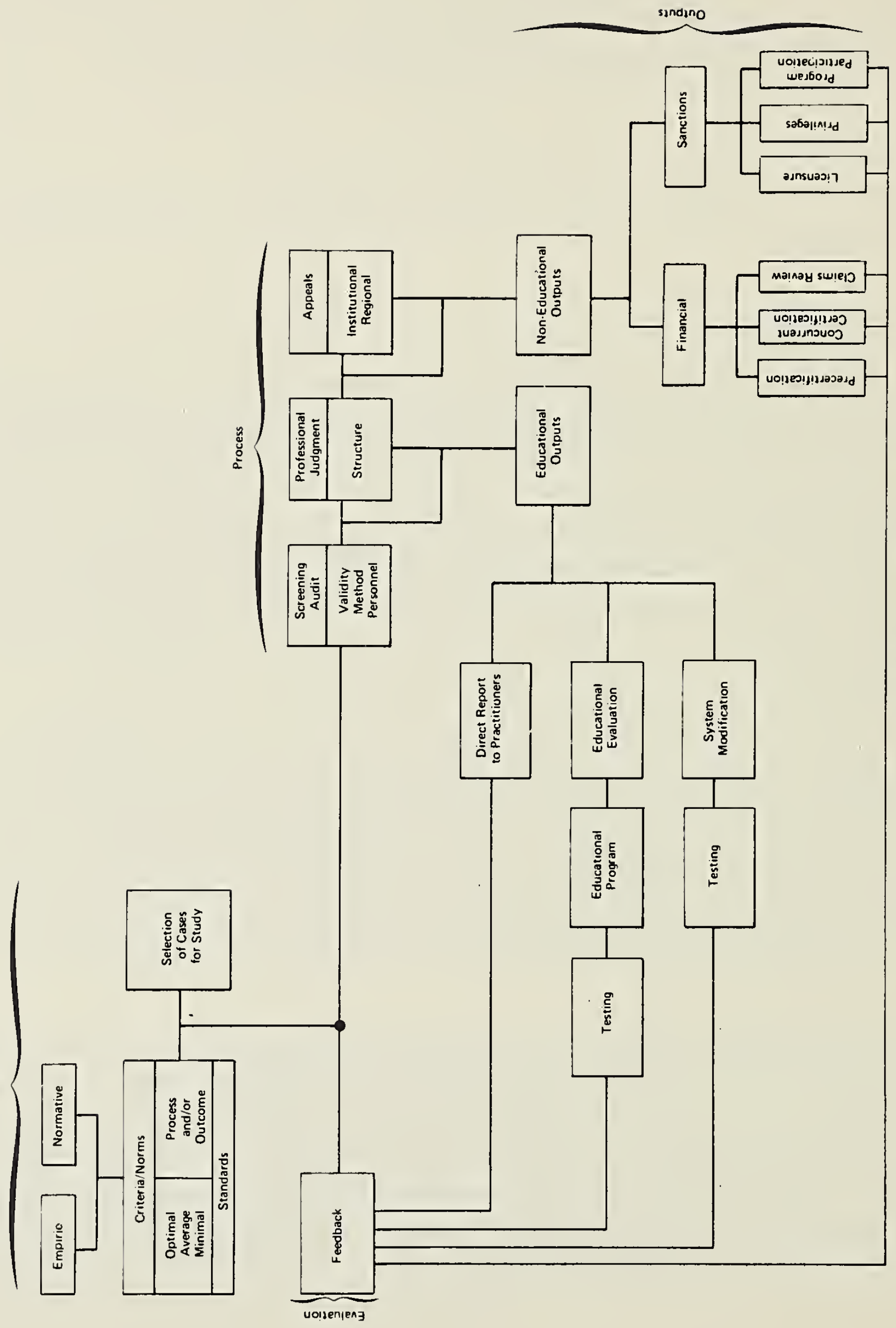

FIGURE 1 SCHEMA FOR PEER REVIEW

### b. Selection of the Cases for Study

The application of peer review to large-scale medical care appraisal usually requires a choice between in-depth study of a small, selected sample and more superficial appraisal of a larger volume of care. The latter approach is frequently constrained by the availability of data reporting sufficient information concerning major segments of health care. In general, screening methods are used on a large sample and deliberative judgment applied to a limited number of exceptions. The choice of cases for screening is generally determined both by the purpose of the study and by the availability of data.

There are three common methods to select cases for screening and a significant number of variations employing mixtures of these approaches. Studies geared to educational problem identification usually sample physicians who would be the recipients of the educational output. The sample frame may include individual physicians or groups of physicians such as the staff of a hospital or group practice. The samples are often voluntary, but could be chosen at random or on any other basis consistent with the purposes of the study.

Studies geared to cost containment generally review the beneficiaries of a specific intermediary or funding program. The samples may include persons eligible for Medicare or Medicaid, all or a subset of Blue Cross subscribers, or the patients enrolled in a specific HMO. As with educational outputs, this selection of cases for study relates to the means by which peer review seeks to impact on the delivery of medical care.

Assuming the validity of the methods and the accuracy of the data, each of these two methods properly defines a stated sample. Difficulties, relating to the sampling frame, often occur when these results are extrapolated to other groups or populations. A third approach to sampling seeks to avoid this problem by selecting cases from a representative population.

## 2. Process

The process of peer review, in large-scale medical care appraisal, involves the application of a screening audit, professional judgment for a limited number of exceptions, and a formally defined route for appeal.

### a. Screening Audit

The screening audit compares information which describes practice in the sample of study cases with explicit criteria and/or norms, previously developed.

Its purpose is to identify a more limited subset of exceptions to established standards or to statistically evaluate physician compliance with explicit criteria and physician performance in relation to explicit norms.

Screening may be performed manually by trained reviewers, or automatically by computers. The former approach tends to be more expensive, takes more time thus delaying or limiting the review, and introduces some lack of uniformity into the review. While the automated approach solves many of these problems, it introduces rigidities into the review and may limit the depth of the review.

The major problems of most screening audits relate to the source, depth, and accuracy of data describing practice in the study cases. Such difficulties often dominate the selection of cases for study. The methodology for most current screening audits calls for the collection of summary data; research to collect and store more nearly total performance data is now underway. Alternately, the screening audit may only require the collection of abstracts which measure compliance with explicit criteria or norms. In the latter case, the first step of the screening audit is performed during the collection of the data.

Since the significance of peer review depends upon the accuracy of the screening audit, most methods incorporate some means to check the reliability of the collected data base.

### b. Professional Judgment

It is axiomatic, in medicine, that every rule has justifiable exceptions. In the interest of simplicity, however, a screening audit includes only limited abilities to perceive these justifiable variations. It follows, then, that some or many of the exceptions detected by screening may be justified; and that professional judgment is necessary to detect the subset of unjustified exceptions.

In most programs, the exceptions detected by non-professionals or computers, are reviewed by a medical advisor, a specialty panel, or a representative committee or board of physicians. Many programs use all three levels of review sequentially depending upon the complexity of the problem. In some cases the professional level of review is not conducted by the staff of the agency detecting the exception but by the staff of the hospital or group to which the exception is reported.

### c. Appeals

Clearly, the final determinations of peer review depend upon the professional judgment exercised by physician reviewers. The possibility of error must be admitted. Despite efforts to the contrary, inadequate information about or inadequate comprehension of a specific case may lead to erroneous judgments.

An appropriate appeal mechanism is necessary to protect both patients and physicians against the consequences of erroneous peer review judgments. Most programs provide for re-review when new information becomes available and a special route of appeal to a specific committee, to the governing body of the program, or to the local or state medical society.

## 3. Outputs

The outputs of peer review programs may be used for educational or non-educational purposes. Though many programs emphasize one or the other, most utilize both types of output, to some degree.

### a. Educational

The current approach to physician continuing education recommends: (1) problem identification; (2) analysis of its causes; (3) a search for solutions; (4) implementation of the solutions; and (5) assessment of the improvement. The process of peer review identifies those physicians with educational problems. Subsequent peer review provides an opportunity to assess their educational gain. The intervening educational steps may be accomplished on an individual or group basis.

Reports may be sent to individual physicians describing their level of performance, in comparison with peer groups, or giving the details of specific cases, where exceptions to accepted criteria or norms were found. These reports, themselves, may provide sufficient education to modify subsequent behavior, depending upon the physician's professional motivation for quality performance and his willingness to conform to group standards.

Frequently common problems will be identified in many physicians who belong to a single hospital staff or a specific medical society. This situation presents an opportunity for group meetings to analyze the problem and group education to seek its remedy.

In many cases the educational solution will not be found in further training or motivation for the physician, but in recognizing systematic constraints on the physician's performance and in making appropriate system modifications to eliminate them.

### b. Non-Educational Outputs

The non-educational outputs of peer review include a variety of financial controls over the reimbursement process and a variety of sanctions which regulate physician activities. Financial controls include approval (or disapproval) of payment through retrospective claims review, and prospective or continuing authorization for payment through precertification. Sanctions may be applied at the level of licensure, hospital privileges, or the continued ability to participate in a specific reimbursement program.

### 4. Evaluation

Evaluation of peer review exists on at least two levels; one internal and one external to each program. Internal evaluation involves the feedback of output data. Closing the loop, by feedback, permits the validation or modification of future criteria, norms and standards and the continued selection of appropriate samples. Continued viability and the acceptance of peer review depends upon such feedback.

External evaluation measures the impact of peer review on the larger regional health delivery system. The multiple parameters for evaluation include:

- Improved physician performance (closer compliance with criteria and/or norms);
- Better health status for the population served;
- Greater efficiency of the health delivery system (more necessary services per unit of overall cost);
- Program benefits versus program costs.

## B. APPROACHES TO PEER REVIEW

This section addresses the practical possibilities for the application of peer review, as previously described, to the purposes specified by P.L. 92-603. To accomplish this, it is necessary to interrelate:

(1) The objectives of the legislation;

(2) The setting for review (hospital, nursing home, ambulatory, and regional);

(3) The perspective for evaluation (administrative, professional, patient, and epidemiologic);

(4) The chronology of review (prospective, concurrent, or retrospective); and

(5) The content of review (medical process, or medical outcomes).

Table I interrelates these diverse considerations and selects specific review programs, which in our opinion, offer practical approaches to medical care appraisal on a regional basis. A textual explication for these selections follows.

P.L. 92-603 mandates a regional review of institutional care, by prospective, concurrent, and retrospective methods, with an implied concern for optimal regional utilization. The necessity for and duration of institutional care, the use of an appropriate institution, and the provision of adequate and relevant services are specifically included. Comparable audit for ambulatory care is optional. Table I relates these objectives to each setting of care.

Since a review of the necessity for hospital admission evaluates institutional use, level of care was not listed as a separate objective. While the legislation excludes consideration of usual and customary fees, it clearly implies concern for the proper utilization of institutional services and the costs they generate. Hospital services and costs are therefore included. The duration of care in nursing homes is pertinent only to the special subset of Skilled Nursing Homes. In most other cases, admission is for the balance of life. The level of care in nursing homes, however, is a dominant consideration and has been separately listed. The objectives for ambulatory care reviews are practically limited to the frequency, quality, and volume of service.

Table I also introduces other perspectives for evaluation. The objectives described above for hospitals, nursing homes, and ambulatory care are generally perceived from an administrative or professional viewpoint. It is equally valid, however, to consider the viewpoint of the individual patient or an epidemiologic viewpoint with concern for specific populations.

Table I provides for programs to appraise both the processes and the outcomes of medical care, following the terminology provided by the glossary of terms in Appendix B. For each, prospective, concurrent, and retrospective approaches were considered.

## TABLE I

## POTENTIAL APPROACHES TO MEDICAL CARE APPRAISAL

(Practical Approaches = X)

| Perspective | Setting | Objectives | Process | | | Outcome | | |
|---|---|---|---|---|---|---|---|---|
| | | | Prospective | Concurrent | Retrospective | Prospective | Concurrent | Retrospective |
| Administrative-Professional | Hospital | Necessity for admission | X | X | X | | | X |
| | | Duration of care | | | | X | X | X |
| | | Quality of Care | | X | X | | X | X |
| | | Services/Costs | | | | X | X | X |
| | Nursing Home | Duration of care | | | | X | X | X |
| | | Level of care | X | X | | X | X | |
| | | Quality of care | | X | | | X | |
| | | Services/Costs | | | | | X | |
| | Ambulatory | Frequency of service | | | | | | X |
| | | Quality of care | | | X | | | X |
| | | Services/Costs | | | | | | X |
| Patient | All | Satisfaction | | | X | | | X |
| Epidemiologic | Regional | Volume of care | | | | | | X |
| | | Services/Costs | | | | | | X |
| | | Mortality-morbidity | | | | | | X |

The necessity for hospital admission can be evaluated by accepted process criteria prospectively, concurrently, and retrospectively. It may also be evaluated against patient outcomes at the time of discharge or subsequent to discharge. These latter studies, by definition, need to be retrospective. The duration of care (LOS) has been treated as an administrative outcome, consistent with the definitions presented in the glossary. It has, and can be, estimated prospectively and evaluated concurrently or retrospectively by empiric norms. The quality of hospital care can only be evaluated during or after the fact. The quality of hospital care has been evaluated concurrently or retrospectively by process standards, and for certain conditions (such as surgical procedures and frequently fatal diseases) by measurable intermediate or final patient outcomes. Specific hospital services and costs have been treated as administrative outcomes, consistent with the definitions given in the glossary. They may be estimated prospectively and evaluated concurrently or retrospectively. Standards for this evaluation will depend upon the prior experience of the institution or composite averages from comparable institutions.

Nursing home evaluations differ significantly from hospital reviews. There is often inadequate information for prospective review, and retrospective studies are markedly limited by infrequent discharges occurring only with death. Furthermore, the primary consideration is not the necessity for or duration of care, as in hospitals, but rather the use of an appropriate level of care. For these reasons we have emphasized evaluation of the level, quality and content of care provided in nursing homes at the time of admission and concurrently throughout the stay.

The level and quality of care provided may be measured by both process criteria and outcome standards. Both may be studied concurrently; the former may also be estimated prospectively. The content of care (services and costs) is, by definition, an administrative outcome which should be evaluated concurrently for maximum impact. The duration of care, in the special subset of Skilled Nursing Homes, is also an administrative outcome which, because of higher cost, should be estimated prospectively and evaluated both concurrently and retrospectively.

Excepting a limited number of catastrophic conditions, ambulatory services are of brief duration. This fact necessitates evaluation by retrospective methods. Volumetric descriptions, including the frequency and type of service, as well as cost, have been treated as administrative outcomes consistent with the definitions given. The quality of ambulatory care may be evaluated by process criteria, and in selected conditions, by measurable intermediate patient outcomes.

Table I suggests the practical measurement of patient satisfaction by retrospective methods. Patient satisfaction may be considered a process outcome, consistent with glossary definitions, and measured by such indicators as compliance with medical regimens, increased knowledge of disease, rate of return, and direct opinion gathered by survey. The table also suggests process studies to measure the manner by which patients utilize the health delivery system such as inappropriate use of emergency rooms. These studies require the development of patient profiles describing their use of care, longitudinally.

Epidemiologic studies of the health delivery system almost always require the collation of multiple provider reports to develop population-based data for linkage with other bodies of health status data. These evaluations are dependent upon the completion of service and are, of necessity, retrospective in nature. The volumes of care delivered and both services and costs have been treated as administrative outcomes. Mortality and morbidity rates are prime measures of patient outcomes.

## THE APPLICATION OF PEER REVIEW TO PSRO

Prior sections dealt, in turn, with the provisions of P.L. 92-603 and with the content of peer review. This section integrates these considerations in an attempt to construct a functional model for PSRO activities.

The legislation specifically mandates the delegated use of hospital utilization review committees and of organized group practices to conduct reviews, providing they demonstrate their capacity to the satisfaction of the PSRO. There is an inherent economy in avoiding duplication, and a programmatic realism in bringing the locus of review as close as possible to the level of operations. For these reasons, the PSRO will need to delegate the responsibility for many review programs and develop adequate means to assure that the programs are properly conducted.

The legislation specifically mandates precertification and both concurrent and retrospective audits, for all institutional services provided by the Social Security Act, to assure the necessity, appropriateness, and quality of the care. Review of ambulatory care is optional. We are concerned with the possibility that efforts to meet these global requirements may expend greater resources on review than the resultant gain in health service efficiency or the quality of care. The reality of this possibility has been demonstrated recently by an audit of the HASP precertification program in Illinois[1]. To avoid this possibility, we strongly recommend that the specific programs of review, conducted by each PSRO, be carefully related to the needs and resources of each designated area. An opportunity for less than complete function during the "conditional contract" period is provided by the legislation.

In the further interest of economy, we believe that each PSRO should be equipped with a macroscopic overview of the health services delivered in its designated area. We believe that regional studies of health services delivery can efficiently monitor satisfactory function and both identify and locate the source of specific problems. Given the identification of a specific problem, an expenditure of greater resources is warranted to determine both its cause and its solution.

To satisfy these various constraints, with the tools available to peer review, we believe that each PSRO will need to incorporate the following five basic functions:

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[1] *Report on the Hospital Admission and Surveillance Program (HASP)* Hospital Week, Vol. 8, No. 39, September 29, 1972.

(1) Standard setting and the selection of cases for study;

(2) Regional monitoring of health delivery indices;

(3) Review of delegated responsibilities;

(4) Operation of undelegated programs; and

(5) Study of consumer satisfaction.

A schema describing these functions in relation to the hospitals, nursing homes, physicians, and the population of each designated area is presented in Figure 2. The schema was designed to incorporate all of the activities previously discussed in this report. We recognize that most conditional PSRO's will activate only part of this functional schema. Textual explication of these activities follows the schema.

## A. STANDARD SETTING AND CASE SELECTION

Each PSRO will need to develop regional criteria for quality of care, norms for the frequency and duration of service, and standards for desired compliance within its designated area. Criteria and standards will be developed by local professional consensus; norms will be derived from local data. They will be reviewed by the National PSRO Council. Justification will be required for any significant deviations from national criteria, norms, and standards.

The PSRO will need to select the cases to be reviewed in each functional element of the program. In part this selection is dictated by law. Review of institutional services provided by the Social Security Act is mandatory; review of ambulatory services provided under the Act are optional; review of the private health care sector is not covered by the legislation. Nevertheless, many PSRO's will probably extend their reviews to the private sector in much the same way that Medicare-mandated Utilization Reviews are often applied to all hospital patients.

The PSRO will therefore need to develop voluntary, cooperative arrangements with physicians, hospitals, and intermediaries to enable the review of non-mandated (private sector) and optional (ambulatory) services. The PSRO will also be required to periodically select specific diagnostic categories, or other classes of patients, for the detailed sample review of mandated services (institutional care under the Social Security Act).

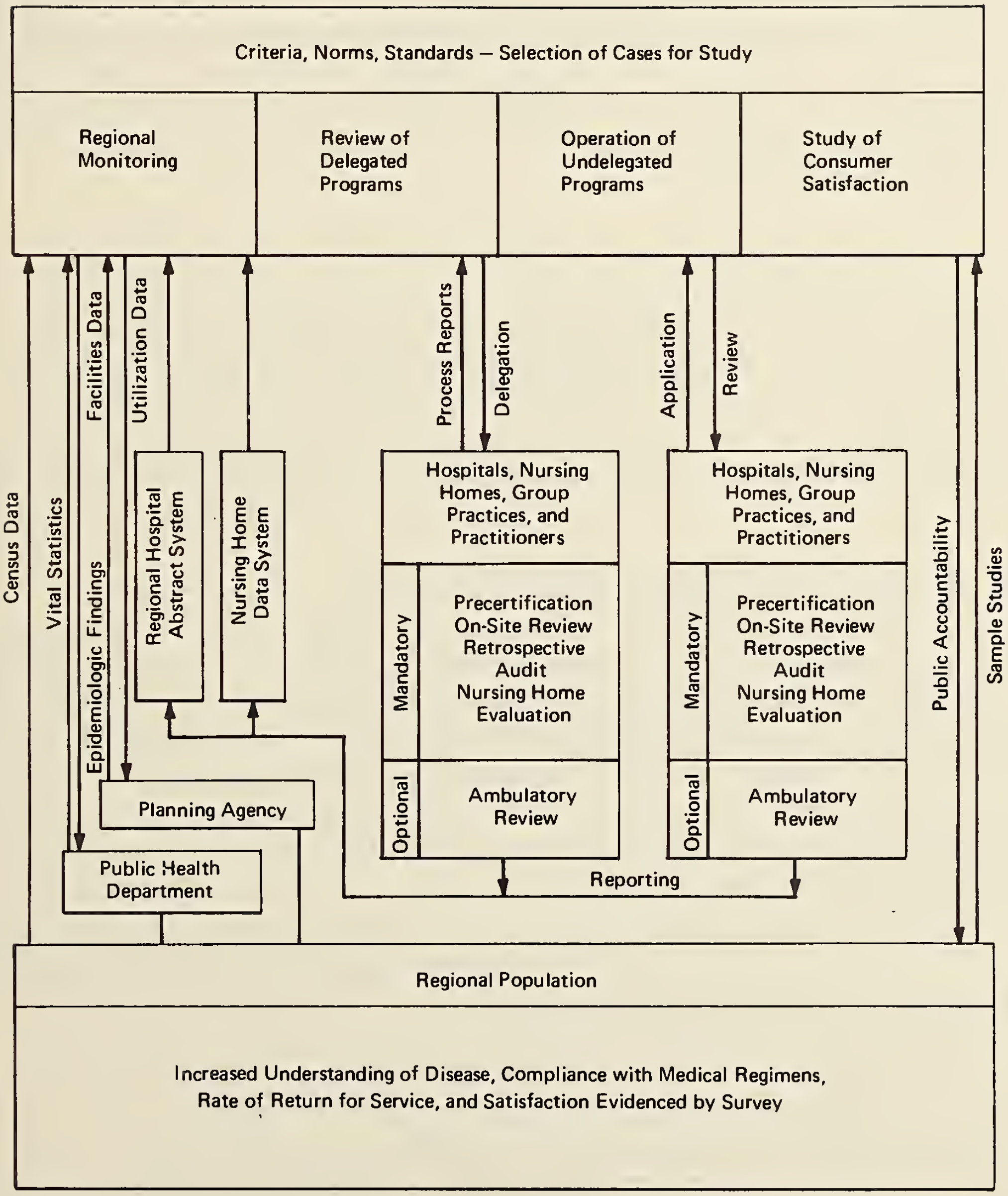

**FIGURE 2 PSRO FUNCTIONS**

## B. REGIONAL MONITORING

The PSRO will need to monitor both the costs and the utilization of all institutional health care for the population served. It will monitor component costs and utilization, attributed to different levels of care and to different common discharge diagnoses. The PSRO should study the distribution of various common institutional diagnoses and the outcomes of regional care as described by vital statistics. Should it so choose, the PSRO may collect similar data for ambulatory care, but will be limited initially to reports concerning the beneficiaries of funded ambulatory programs, outpatient departments, and those enrolled in prepaid practice.

To accomplish these goals, the PSRO will need to receive the data described in the Uniform Hospital Discharge Data Set[1,2] from a regional Hospital Abstract System and from a regional Nursing Home Reporting System. Other significant input information should include the demography of the regional population, from census data; regional vital statistics from the local public health department, and facilities data from the regional health planning agency. Data partially describing ambulatory care can be provided by the accumulation of claims and encounter forms.

## C. REVIEW OF DELEGATED RESPONSIBILITIES

The PSRO will need to delegate the responsibility for Precertification, On-Site Concurrent Review, Hospital Discharge Auditing, Nursing Home Evaluation, and the optional review of ambulatory care to those institutions which satisfactorily demonstrate their capacity to perform these reviews. Where practical, the PSRO may encourage small hospitals to share their resources for the conduct of these programs or to develop working relationships with larger institutions for the same purpose.

There are two ways by which the PSRO can assure itself that these reviews are being conducted in a satisfactory manner:

(1) Each institution with delegated responsibilities will report its methods and data describing the process of its reviews to the PSRO.

(2) Regional monitoring will provide the PSRO with evidence of the successful (or unsuccessful) impact of the institution's review program.

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[1] *Uniform Hospital Discharge Data*, Health Services Foundation, Government Printing Office, Publication No. (HSM) 72-3025, 1972, 21 pp.

[2] *Common Data Set for Hospital Management*, Hospital Research & Educational Trust, Government Printing Office, Publication No. (HSM) 72-3026, 45 pp.

## D. OPERATION OF UNDELEGATED PROGRAMS

There will undoubtedly be a number of institutions in each area which are unable to conduct their own effective review program. Others will be unwilling to assume this responsibility and still others will have failed in the performance of this delegated duty. For all of these institutions, and for most of ambulatory care, where few institutional intermediaries exist, the PSRO will need to operate its own review programs. These should include:

(1) Precertification for hospital services,

(2) On-Site Concurrent Hospital Review,

(3) Hospital Discharge Audits,

(4) Prospective and concurrent nursing home evaluation, and

(5) Retrospective review of ambulatory care.

## E. STUDY OF CONSUMER SATISFACTION

The PSRO should conduct or commission sample studies of consumer satisfaction by survey, evaluate patient gain in understanding of disease, study compliance with medical regimens, and measures of the rate of return for service. The PSRO should develop mechanisms of public accountability to the population of its designated area including, but not limited to, public reports and the evaluation of recurring patient complaints.

By the application of considerable skill, PSRO's will have the opportunity to coordinate these five areas of function; to relate multiple institutions and agencies; and to integrate various bodies of discrete, though related, data. These linkages could permit more effective review of:

- Prospective, concurrent and retrospective hospital care from admission through discharge;

- Related systems of health care including hospitals, nursing homes, and ambulatory care;

- Interrelations and overlaps between the private and public health care sectors; and

- Effects of the health delivery system on the population at risk.

We believe that the complete requirements of P.L. 92-603 exceed the capabilities of the current state-of-the-art of medical care appraisal and the resources of most areas. While planning for full functional implementation, most PSRO's will have to carefully select specific programs for early implementation. Care will be required to relate these choices to the needs and resources of each designated area.

In our opinion, there is a certain set of functions which provide the critical mass necessary for continued PSRO growth. This, however, should not preclude more mature organizations, such as EMCRO's, or existing Foundations, from implementing other established programs. Any number of additional programs, including full functional implementation of all PSRO functions, should be considered when possible.

The minimal functional set, as well as subsequent priority considerations are suggested below:

Minimum Set of Functions

- Regional Hospital Abstract System
- Retrospective Hospital Audit
- Appeals

Programs for Early Implementation

- Precertification for Hospital Admission
- On-Site Concurrent Hospital Review
- Precertification and Recertification of Nursing Home Care in relation to Submitted Treatment Plans.

Each PSRO needs the nucleus of a Regional Monitoring System in order to have the critical mass to enable further growth. The current state-of-the-art will not permit rapid implementation of Nursing Home Data Systems, but Regional Hospital Abstract Systems could be rapidly implemented throughout the nation. Given this data source, each PSRO could conduct retrospective audits by the simple addition of local criteria. An adequate appeal mechanism, as part of a minimal set of functions, does not require justification.

Regional Hospital Abstract Systems could be rapidly developed by subscribing to existing systems such as PAS, QUEST, CUPIS, HUP, and HDS, or by the purchase of software packages from such existing systems. Blue Cross of Northeast Ohio was able to implement its QUEST system in six (6) Cincinnati hospitals within three months. The modest operating costs of these systems ($0.40–0.75 per discharge) is an allowable cost under most public and private reimbursement formulae and participation in such data systems is now urged by Blue Cross. The initial cost of purchasing existing software for a new system is modest (estimated at $1–2,000). Furthermore, some of these systems were developed with the support of Federal grants. This investment can now provide a dividend in the form of more widespread use.

Three additional programs are listed for early implementation. Precertification is required by the law, and on-site concurrent review required to make precertification effective. Nursing Home review is required by the law.

## SPECIFIC PEER REVIEW PROGRAMS

The criteria and methods required for PSRO have been mentioned in prior chapters to the extent necessary to define various approaches to peer review. This section addresses the current availability of guidelines, specifying their present state of development, necessary modifications or extensions of existing models, and newly needed criteria, methods, or data processing systems.

To enable further discussion, we have decided to classify both existing guidelines and necessary new or modified guidelines in relation to the programs they support. Table II summarizes existing guidelines, and Table III necessary new or modified guidelines, required for the programs mentioned earlier. The discussion which follows has been keyed to these same programs of peer review.

### A. HOSPITAL REVIEW PROGRAMS

Age-specific norms for length of hospital stay by diagnosis, modified by the presence or absence of surgery and complicating additional diagnoses, are in common use in many areas of the country. At the present time, most of these norms are based on PAS data provided by the Commission on Professional and Hospital Activities[1]. These data are available for the entire country or for large regional subdivisions including many states.

PAS data are derived from a sample of reporting hospitals throughout the nation. Though the sample is large, it tends to be skewed by unequal geographic distribution, and by greater representation of small, non-teaching hospitals outside of major metropolitan centers. Furthermore, the attributes by which length of stay are subclassified do not completely satisfy the needs of many areas where the data is used. For these reasons regional hospital data systems, such as HUP[2], QUEST[3], and CUPIS[4], have been developed in many areas of the country. They provide more nearly total hospital reporting for their designated areas, and develop empiric length of stay norms by a logic more relevant to their local use. Where regional hospital data systems are still under development, or in the planning stage, it is common to use regional PAS norms while gathering regional data for the later determination of local empiric norms for length of stay.

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[1] Slee, V.N. *Professional Activity Study*. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

[2] Lewis, P.M. *The Hospital Utilization Project of Pennsylvania*. Medical Care, Vol. VIII, No. 4, Supplement; July-August, 1970.

[3] Mannix, J.R. *The QUEST Program of Northeast Ohio*. Medical Care, Vol. VIII, No. 4, Supplement; July-August, 1970.

[4] Thompson, J.D., et al. *Connecticut Utilization and Patent Information System, CUPIS.* New Haven: Yale University, Department of Epidemiology and Public Health, 1971 (unpublished).

## TABLE II

## EXISTING GUIDELINES

| Program | Target | Existing Guidelines | |
|---|---|---|---|
| | | Criteria | Methods |
| Precertification | LOS Necessity for Admission | Norms for LOS by diagnosis from national or regional data systems. | CHAP, HAPP, HASP |
| On-Site Concurrent Review | LOS Quality of Care | | OSCHUR CONSERVE CHAP, CHEC |
| Discharge Abstract System | LOS Quality of Care | Local normative criteria for quality of care. | PAS and Existing Regional Data Systems |
| Prospective Review of Treatment Plan | LOS at each level of care | Not yet available in significant detail | Precertification (New Mexico, Georgia) |
| Nursing Home Data System | Level of Care Quality of Care | | Developing Data System (Georgia) |
| Chart Audit with License Inspection | To validate Reporting | | None |
| Claims or Encounter Review | Frequency Quality | Minimal local criteria and empiric norms | Examples of Automated Claims Review, Encounter Abstracts, and Encounter Reporting |
| Patient and Provider Profiles | Longitudinal Quality | Model practice patterns (San Joaquin) | On-Line Profiles (New Mexico) |
| Consumer Satisfaction | Satisfaction<br>Continued Use<br>Compliance<br>Educational Gain | Not yet available | Research Techniques |
| Regional Monitoring | Program Impact On Target | Empiric Comparisons | Epidemiologic Research Techniques |

## TABLE III

## REQUIRED NEW OR MODIFIED GUIDELINES

| Program | Target | New or Modified Guidelines | |
|---|---|---|---|
| | | Criteria | Methods |
| Precertification | LOS Necessity for Admission | Expand and refine regional LOS norms and criteria for admission | Automated Processing |
| On-Site Concurrent Review | LOS Quality of Care | Methods for case selection | Replicate and extend current programs |
| Discharge Abstract System | LOS Quality of Care | Expand and refine methods for exception and statistical reporting | Expand and refine regional data systems |
| Prospective Review of Treatment Plan | LOS at Each Level of Care | Criteria for review of treatment plans | "Tie in" with precertification programs |
| Nursing Home Data System | Level of Care Quality of Care | Normative criteria for level and quality of care. Standards for anticipated outcomes | Automate comparison between patient problems and services rendered |
| Chart Audit with License Inspection | To Validate Reporting | None | "Tie in" with state licensing inspection |
| Claims or Encounter Review | Frequency Quality | Expand and refine norms for frequency of visits and criteria for quality of care | Expand and refine central collection of claims and encounter forms |
| Patient and Provider Profiles | Longitudinal Quality | Further develop model treatment plans | Automate application to profiles |
| Consumer Satisfaction | Satisfaction<br>Continued Use<br>Compliance<br>Educational Gain | Develop Criteria | Application of Research Techniques |
| Regional Monitoring | Program Impact on Target | Significance of regional variation | Application of Research Techniques<br>Central Reporting by Data Collection Systems |

The common analytic approach, in all of these data systems, is the development of age and diagnosis specific frequency distributions for length of stay. The 50th percentile, or average length of stay, is most commonly used as the norm; in some instances the 75th or even the 90th percentiles are accepted as an upper limit. Less concern has been evidenced for short stays, although the approach is equally applicable to this problem.

Normative criteria for quality hospital care, by diagnosis, have been locally developed in many areas of the country. They are generally optimal, process criteria patterned after the work of Beverly Payne.[1],[2] Their repetitive development, in different areas of the country, has been accompanied by broader physician involvement in criteria generation, and by the newer use of branching logic to account for contingencies which may occur during the natural course of disease or its treatment.

Explicit criteria, for common hospital diseases, describing the indications for admission, requirements to justify the discharge diagnosis, and the relevance of tests and treatments to the diagnosis, are now available from the work of Payne[3], HUP[4], the Hennepin County Foundation[5], and nearly all of the currently funded EMCRO's.

Criteria for quality of care and length of stay, in hospitals, are fully developed and ready for use. Criteria governing the quality of hospital care are available for over 60 percent of all admissions; criteria governing length of stay are now available for over 75 percent of all hospital admissions.

### 1. Precertification

Precertification is most appropriate for elective hospital admissions, but has been required for the continuing care of emergency admissions and for long stays which exceed originally anticipated norms. Well known precertification programs now exist in Sacramento (CHAP)[6], Illinois (HASP)[7], and New Mexico (HAPP)[8]

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[1] Payne, B.C.(ed). *Hospital Utilization Review Manual.* Ann Arbor, The University of Michigan, 1968.

[2] Payne, B.C. *Use of the Criteria Approach to Measurement of Effectiveness of Hospital Utilization.* Journal of the American Medical Association, 196,:1066-8, 1966.

[3] Ibid.

[4] Lewis, P.M., op. cit.

[5] *Quality Review Program and Prospective Utilization Program.* Work in progress. Developed by the Foundation for Health Care Evaluation of the Hennepin County Medical Society.

[6] *Certified Hospital Admission Program (CHAP).* Work in progress. Developed by the Medical Care Foundation of the Sacramento County Medical Society. Third Printing – July, 1971.

[7] *Hospital Admission and Surveillance Program (HASP).* Work in progress. Developed by the Illinois Foundation for Medical Care of the Illinois State Medical Society.

[8] *Hospital Admission Precertification Program (HAPP).* Work in progress. Developed by the New Mexico Foundation for Medical Care of the New Mexico Medical Society.

Precertification may be performed by individual physicians, using varied and implicit criteria, as in the Medicare program; it may be formalized with explicity critieria and delegated to hospital utilization review committees; or it may be conducted on a regional basis by an intermediary, EMCRO, or PSRO. Various combinations of these approaches are also possible.

The objective of precertification is to control the volume of hospital service by specific and limited prospective authorization. This is accomplished in two ways:

(1) By reviewing the necessity for hospital admission against implicit or explicit criteria describing indications for admission for the most common diseases;

(2) By prospective authorization for a length of stay based on empiric, average regional or national experience for that specific disease.

The source document for precertification is always on application completed by the physician proposing to provide the service. The application is usually processed by a trained reviewer, backed by medical consultants; where explicit criteria have been developed, however, precertification could be largely automated.

Methods for manual precertification programs have been developed and now exist in Sacramento (CHAP), New Mexico (HAPP), and Illinois (HASP). Automation of one component, the authorization of an appropriate length of stay, has been accomplished by New Jersey Blue Cross.[1] Given explicit criteria for both length of stay and the necessity for admission, and a properly designed application form, we believe that precertification for both functions can be completely automated.

We have mentioned the availability of criteria for length of stay and quality of care (including the necessity for admission) in many areas of the country. Each of these unique efforts has built upon the base of experience gained by prior approaches. Despite the general similarity of the criteria finally developed, few localities appear willing to wholly accept criteria developed elsewhere. It appears that local involvement in the generation of criteria is necessary for acceptance. Recognizing this fact, we appreciate and recommend the continued local development of criteria for the quality of care (including the necessity for hospital admission) and the further development of regional hospital data systems to expand and refine local norms for length of stay. Though this consideration requires new guideline developments, they represent an extension of existing guideline models and could be rapidly developed using already documented methods.

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[1] Bailey, D.R. and Riedel, D.C., *Recertification and Length of Stay: The Impact of New Jersey's AID Program on Patterns of Hospital Care*, Blue Cross Reports, 6:1-10. July, 1968.

The value of precertification programs has not yet been fully documented. The admitting diagnosis, which defines the needs for care, may be hypothetical in a patient who presents with an undiagnosed problem. Little is known concerning the effect of delays introduced by precertification and possible legal liabilities for denying admission. Physicians rapidly learn how to avoid denials of precertification. Finally, the cost-to-benefit ratio for precertification in the HASP program has been questioned by a recent audit[1].

The New Jersey Blue Cross experience with precertification, carefully analyzed by Riedel[2], demonstrated an initial decrease in length of stay which was not maintained over time. It has been suggested that the impact of precertification would be enhanced by continuing On-Site Concurrent Hospital Review.

In summary, then, precertification programs can be used to evaluate both the necessity for hospital care and an appropriate length of stay. They are most effective when re-enforced by simultaneous On-Site Concurrent Hospital Review. These efforts should:

(1) Emphasize a standard list of the most common admission diagnoses; and

(2) Use explicit criteria and automated processing, insofar as possible.

Model guidelines for length of stay and necessity for admission, and manual methods for precertification now exist. There is an additional need for:

(1) Expansion and refinement of local criteria describing the necessity for admission;

(2) Expansion and refinement of regional hospital discharge data systems to develop average, local empiric lengths of stay by diagnosis; and

(3) Use of explicit criteria with appropriate application forms to develop fully automated precertification programs.

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[1] *Report on the Hospital Admission and Surveillance Program (HASP).* Hospital Week, Vol. 8, No. 39. September 29, 1972.

[2] Bailey, D.R. and Riedel, D.C., op. cit.

## 2. On-Site Concurrent Hospital Review

On-Site Concurrent Review is primarily appropriate to hospital settings for two reasons.

(1) The logistics of providing a trained reviewer require a critical mass of providers in one site for cost justification.

(2) The impact of this approach is dependent upon the support of an organized, functioning, and effective medical staff.

On-Site Concurrent Hospital Review limited to length of stay is now being conducted in Georgia (CHEC)[1] and Sacramento (CHAP)[2]. On-Site Concurrent Review for both utilization and the quality of care is now being performed in Utah (OSCHUR)[3] and in Multnomah County, Oregon (CONSERVE)[4].

The objectives of these current programs variably include:

(1) Assignment of a diagnosis specific length of stay with appropriate modifications resulting from continued on-site review of the patient's changing condition;

(2) Concurrent review of the necessity for hospitalization, appropriateness of the diagnosis, relevance of the investigation and treatment, and the quality of the medical record by a trained nurse reviewer supported by the hospital's own staff mechanisms and committees;

(3) Use of the nurse reviewer to abstract medical records, as they are completed, for retrospective comparison with normative process criteria for the quality of care.

Since the third objective can be accomplished equally well, and perhaps less expensively, by the records librarian, we do not recommend this facet of the program.

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[1] *Certified Hospital Extension of Care (CHEC).* Work in progress. Developed by the Georgia Medical Care Foundation of the Medical Association of Georgia.

[2] *Certified Hospital Admission Program (CHAP).* Work in progress. Developed by The Medical Care Foundation of the Sacramento County Medical Society. Third Printing – July, 1971.

[3] *On-Site Concurrent Hospital Utilization Review (OSCHUR).* Work in progress. Developed by the Utah Professional Review Organization of the Utah State Medical Association.

[4] *Concurrent On-Site Evaluation and Review Effort (CONSERVE).* Work in progress. Developed by the Multnomah Foundation for Medical Care and the Multnomah Experimental Care Review Organization of the Multnomah County Medical Society (Portland, Oregon).

On-Site Concurrent Hospital Review is exquisitely dependent upon the skill and tact of the nurse reviewer and upon the strength of the hospital medical staff organization whose participation makes this a peer review program. It offers an opportunity to influence the quality of medical care while it is being delivered. Because of the need for human intervention, this approach is considerably more expensive than automated reviews. Current estimates yield costs ranging up to $15 per discharge.

On-Site Concurrent Hospital review could be conducted in large institutions, by a nurse coordinator employed by the hospital who reports to the hospital utilization review committee. This approach has been implemented, in part, by New Mexico[1] for HAPP participating hospitals. The feasibility of the program in small institutions will depend upon the use of a single nurse coordinator by multiple hospitals or on the use of a nurse coordinator for multiple functions in a single small hospital. The use of a hospital employee to reduce hospital utilization may generate a conflict of interest; resolution may depend upon a reorientation of current hospital objectives.

On-Site Concurrent Hospital Review, itself, cannot be automated. Many opportunities exist, however, for mutual support between this program and automated programs for precertification and hospital discharge auditing.

The availability of norms for length of stay and criteria for quality care have already been discussed. Further development of quality criteria and regional data systems to develop local norms for length of stay are necessary.

The methodology for On-Site Concurrent Review of both the length of stay and quality of care has been developed, documented, and demonstrated in Utah (OSCHUR) and in Portland, Oregon (CONSERVE). Methods for On-Site Concurrent Review of length of stay, alone, have been demonstrated in Sacramento (CHAP) and in Georgia (CHEC). These methods require replication and extension to other sites for national application.

The manpower required for On-Site Review of all hospital cases would be prohibitive. Guidelines will need to be developed to specify the sample of cases to be reviewed by the program; for example, all long stays and a ± 10 percent sample of other cases, including short stays and a changing variety of selected diagnoses. Sample studies would be geared only to educational outputs.

In summary On-Site Concurrent Hospital Review can be conducted by nurse coordinators (or other trained personnel) employed by the hospital, or a group of small hospitals, reporting to the hospital utilization review committee, with the added support of medical advisors on the hospital staff. These efforts should emphasize:

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[1] *Hospital Admission Precertification Program (HAPP)*, op. cit.

(1) Modification of authorized length of stay, in relation to the patient's changing condition;

(2) Concurrent review of quality to influence care while it is being delivered.

Guidelines for length of stay and quality of care, and models for On-Site Concurrent Hospital Review, are now available in selected areas of the country. There is an additional need for:

(1) Expansion and refinement of local criteria and norms;

(2) Replication and extension of current program models for On-Site Concurrent Review by hospital-employed nurse coordinators, reporting to the hospital utilization review committee and supported by medical advisors on the hospital staff;

(3) Cooperation between small hospitals for the shared use of nurse coordinators; and

(4) The development of guidelines to specify the cases selected for On-Site Concurrent Hospital Review.

### 3. Discharge Abstract Systems

Retrospective medical audits, in hospitals, have been conducted since 1914 by appropriate committees using case review techniques and implicit criteria. Since the advent of Medicare, utilization review for length of stay has been added to quality review as a major focus for these activities.

In the past decade, sophisticated computer techniques, operated by national or regional programs, have helped to display and sort the material for review. Central reporting by many institutions has added an additional dimension to the review; namely, the opportunity for inter-hospital comparison. The provisions of P.L. 92-603 now add yet another dimension; namely, central review by accepted regional criteria.

Available hospital data collection systems depend upon the information in a source document prepared by the medical records librarian at the time of discharge or when the record is completed. The amount of data required by each system is variable, but a minimum set of basic data has recently been established[1]. Computer processing permits various displays of the data, statistical summaries, and the development of managerial indices. These data permit evaluatory comparisons with other time periods, other institutions or professionals, and with accepted criteria or norms.

Length of stay is commonly evaluated retrospectively by hospital abstract systems. This evaluation depends upon:

(1) The development of age specific empiric norms for length of stay by diagnosis, (with or without surgery, and with or without multiple diagnoses) from a large number of national or regional reporting institutions;

(2) The comparison of each hospital, service, or physician with a comparable universe selected in accordance with specified characteristics; and

(3) The reporting of comparative statistics, or exceptions which deviate from these norms, for more intensive hospital review.

The quality of care may be measured by the relevance of procedures and treatments to the discharge diagnosis. Branched logic permits evaluation of various contingent possibilities. Normative, process criteria for this evaluation are usually structured to indicate:

- Investigations and treatments recommended for each common diagnosis, and

- Investigations and treatments frequently associated with each common diagnosis.

Investigational procedures and treatments, submitted to the abstracting system, may be reported to the subscribing hospital in the form of a statistical index, such as the percentage of patients with pneumonia who did not receive chest X-rays, or as an exception list of all patients with pneumonia who did not receive chest X-rays. Exception reporting is, by far, the more common approach. Quality exceptions may be noted, and reported, in each case where recommended investigations and procedures were not done; professional review may indicate that these cases represent inadequate care. Similarly, cases may be noted, and reported as exceptions, when procedures and treatments were performed which are neither recommended nor commonly associated with the diagnosis; professional review may indicate that these cases represent excessive or inappropriate care. When using explicit quality criteria, care must be exercised to avoid promoting excessive medical care designed only to avoid the implication of under utilization.

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[1] Uniform Hospital Discharge Data and Common Data Set for Hospital Management, op. cit.

The necessity for admission, including the validity of the discharge diagnosis, may be studied retrospectively by hospital abstract systems. Available criteria for this evaluation usually refer to the content of the admission note, or the initial history and physical examination. Special training is required for records librarians to be able to abstract this information from the medical record. Since the extra effort, and cost, may not be worth the additional gain, and since this facet of evaluation is perhaps better performed by prospective and concurrent methods, this objective for discharge abstracting is not recommended.

Data concerning outcomes, other than the condition at the time of discharge, are not generally available to hospital abstract systems, which are sharply limited by the lack of follow-up information. Therefore, a concentration on outcome evaluation by the retrospective methods available through hospital abstract systems is not recommended.

Criteria for length of stay and quality of care are available from the same sources as for Precertification and On-Site Concurrent Review; the need for extension to develop new local criteria in each review site remains valid.

Criteria for the quality of care are slightly more complex than for length of stay or necessity for admission. Quality of care criteria generally specify both tests and treatments which are recommended for each diagnosis, and those which are commonly associated with each diagnosis. Deviation from these brackets defines inadequate care, on the low side, and excessive or inappropriate care, on the high side. Furthermore, branching logic offers the opportunity to define criteria not only for a specific diagnosis, but for contingent possibilities which may occur during the course of a specific disease. The bracketed use of recommended and appropriate tests and treatments and the application of branching logic have been tried and developed in specific areas of the country. As with criteria, in general, these techniques need local replication in each new area.

Methods for discharge abstracting and the display of performance summaries have been thoroughly developed by CPHA[1] for its PAS system and by regional systems such as QUEST[2], HUP[3], and CUPIS[4]. Each of these systems has developed statistical indices to compare each hospital with a comparable inter-hospital universe. Exception reporting after comparison with explicit disease specific, process criteria is a more recent development which has been demonstrated in Hawaii[1] and Mississippi[2].

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[1] Slee, V.N., op. cit.

[2] Mannix, J.R., op. cit.

[3] Lewis, P.M., op. cit.

[4] Thompson, J.D., et al., op. cit.

The relative value of national or regional hospital abstract systems was considered. Regional systems offer several specific advantages, which promote better acceptance, including:

- Local control,
- Locally developed criteria,
- Simplified exception reporting, and
- Greater responsiveness to local needs.

Hospital Abstract Systems are now widely used to support peer review activities. Despite laudable goals, they have been accused of producing a vast amount of data untouched by the human mind. This difficulty may be obviated by the more widespread use of plain English exception reports and by the development of simple, useful statistical indices. Furthermore, Discharge Data Systems are entirely dependent upon comparisons with discharge diagnoses. Considerable hospital care may justifiably relate to an admitting problem, rather than the discharge diagnosis finally developed.

In summary, retrospective hospital audits can be conducted with the support of regional hospital abstracting systems. They should emphasize:

(1) Evaluation of length of stay by empiric regional norms;

(2) Quality of care determined by comparison of procedures and treatments with regionally accepted process criteria and some intermediate outcomes;

(3) Contingent branched logic to study quality of care; and

(4) Exception rather than total reporting.

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[1] *Hawaii Experimental Medical Care Review Organization* of the Hawaii Medical Association. Work in progress.

[2] *Mississippi Experimental Medical Care Review Organization* of the Mississippi State Medical Association. Work in progress.

Necessity for admission, the validity of the discharge diagnosis, and most patient outcomes, are better evaluated by other methods.

The basic techniques for hospital discharge data collection now exist, and are in use somewhere in the nation. Several, however, are new enough, or not yet widespread enough, to necessitate the following requirements for new guidelines:

(1) Support for the development and extension of regional hospital abstract systems throughout the country;

(2) Further refinement in the technique of exception reporting; and

(3) The design of new indices for statistical reporting.

## B. NURSING HOME REVIEW PROGRAMS

Nursing homes are now reviewed by state departments of health and by the Joint Commission on Accreditation of Hospitals. These reviews are designed to certify the presence of an adequate structure, staff, and organization for various levels of care. In some states, Medicaid patients must be precertified for an appropriate level of care.

Prospective review is sometimes difficult in the nursing home setting, since there is often inadequate information concerning the patient prior to admission. Furthermore, long stays and changes in the patient's status, may require revision of the appropriate level of care. In most nursing homes, excluding the subset of Skilled Nursing Homes, patients are admitted for the remainder of their lives. Retrospective review, as after hospital discharge, would be limited only to deaths and would occur too long after the delivery of service to be of great value.

For these practical reasons, we emphasize the importance of concurrent review in nursing homes. An advanced model for such automated review is now being developed by the Georgia EMCRO[1] which began implementation during January, 1973.

Georgia is developing a source document to be reported by nursing homes, for each patient, within thirty days of admission, at subsequent 180-day intervals, or more frequently when indicated by a changing or unstable patient status. The source document includes the information needed to develop a problem statement for each patient such as diagnosis, status of the condition, nursing or other treatment requirements, and drug needs, as well as functional and behavioral status. The source document also includes a description of the services actually provided to each patient. Automated filing and retrieval of this information are included.

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[1] *Nursing Home Data System.* Work in progress. Developed by the Georgia Experimental Medical Care Review Organization of the Medical Association of Georgia.

At the same time, the Georgia EMCRO and the State Nursing Home Association are jointly developing explicit criteria for the automatic comparison of patient problems with services rendered. By this means, they hope to determine:

- Appropriateness of the level of care,
- Appropriateness of specific services in relation to patient needs, and to
- Evaluate changes in the patient's status.

Their criteria are largely normative, optimal, and process; some outcomes, however, are included in their evaluation of changing patient status. The system is still in its design stage and is yet to be fully tested.

The Georgia model depends upon recurrent monitoring of the relevance of services to patient problems, and the development of criteria governing this relationship. This is essentially comparable to the development and use of criteria describing quality hospital care for each common diagnosis. Unfortunately, the problem statement for most nursing home patients is more complex than for hospital patients and less completely described by the diagnosis, alone. Additional parameters are necessary, as in the Georgia model, to develop an adequate problem statement and the pertinent criteria for relevant care. This difficulty should not discourage, but will probably slow the full development and availability of the Georgia model.

The comparison between patient needs (problem statement) and services rendered can also be approached in two steps. A treatment plan, which is at least theoretically in common use, relates the problem statement to the services required by each patient. Treatment plans, in fact, describe the criteria of care for each case and will be summarized in the Georgia criteria. Pending the availability of the more sophisticated Georgia model, treatment plans could be required by the PSRO prior to admission and at selected subsequent intervals. Sample record audits, during regular state licensing inspections could be used to check the validity of the plans and their implementation.

The state-of-the-art of nursing home evaluation is far less developed than the evaluation of hospital care. As a result, there are greater requirements for new criteria and methodologies.

### 1. Prospective Review of Treatment Plans

Criteria will be needed to evaluate the relevance and the implementation of submitted treatment plans. Methods will be required to include the submission of treatment plans in existing or newly required precertification programs.

### 2. Nursing Home Data System

Further development of the Georgia model will be needed. It will be necessary to develop:

- A uniform base of patient status information adequate to the development of a patient problem statement;
- A uniform base for service reporting adequate to define the care delivered to each patient;
- A functional classification of patients permitting the storage and retrieval of the data described above.
- Normative criteria for the quality of care and appropriateness of the level of service; empiric norms for length of stay at each level of care; and standards for anticipated outcomes.
- Automated methods for the storage and retrieval of patient data and for comparison with explicit criteria.

### 3. Chart Audit with License Inspection

Both guidelines and methods will be required to conduct sample chart audits during the regular licensing inspection of nursing homes. Initially these should be geared to evaluate the validity of treatment plans and to gather evidence of their implementation. Subsequently, chart auditing could be used to check the validity of abstracts reported to a Nursing Home Data System.

Despite emphasis on concurrent nursing home evaluation, we appreciate the desirability of initial prospective authorization prior to admission. We also appreciate the need for length of stay estimates by level of care, and total stay estimates for the special subset of Skilled Nursing Homes, which have a more transient population.

In summary, prospective and concurrent nursing home programs can be conducted to emphasize a review of the appropriateness of care (planned or given) in relation to individual patient needs. Prospective authorization for length of stay at each level of care (including total stay in skilled Nursing Homes) should be provided. Gradual development of a review program, taking present realities into account, is possible:

(a) Initially, prospective submission of a treatment plan, relative to the patient needs, prior to admission and at stated intervals thereafter.

(b) Sample record audit, in conjunction with state licensing inspection, to check the validity of the treatment plan and its actual use.

(c) Work towards the development of a functional, rather than a diagnostic, patient classification system and process criteria for care partly based on information submitted in the treatment plans.

(d) Design of an abstract and reporting system modeled after the Georgia approach.

(e) Use of this system for reimbursement and claims review.

(f) Episodic on-site sample audits (in conjunction with state licensing review) to validate data submitted to the reporting system.

Implicit methods for nursing home precertification, some explicit criteria governing level of care, and early designs for an Automated Nursing Home Data System now exist. Many new guidelines will be needed for nursing home review. There is a need for:

(1) Criteria and methods to review treatment plans in conjunction with precertification programs;

(2) A functional classification of nursing home patients;

(3) Design and implementation of a Nursing Home Data System including patient status descriptors (problem statement), care descriptors (service reports), and automated comparison with explicit criteria (treatment plans).

(4) Guidelines and methods for sample chart audits (during state licensing review) to validate reported data.

## C. CLAIMS FORM OR ENCOUNTER REVIEW OF AMBULATORY SERVICES

Auditing the quality of ambulatory care is optional under P.L. 92-603. If done, it need be retrospective, and because of the huge volume of services, must be automated. The major difficulty is the lack of an adequate source document describing the content of ambulatory services in sufficient detail. The best current approach to such data is the claims form, where required, and the encounter document, where it is now in use or can be initiated. Practically, this limits ambulatory review to the beneficiaries of ambulatory insurance programs or those enrolled in prepaid group practice.

Efforts are under way to define criteria for the quality of ambulatory services. For reasons of simplicity, and to minimize the need for new data, these efforts have concentrated on:

- Frequency of visits by diagnosis or condition, and
- Relevance of treatments and tests to the diagnosis or condition.

A limited number of normative criteria have been locally developed, in a number of sites, for both the frequency of visits and the relevance of tests and treatments to a number of common ambulatory conditions. Minimal criteria have been developed in New Mexico[1] to serve as clerical guidelines for non-professional reviewers, to aid in the detection of Medicaid cases where professional review is mandatory. Optimal criteria for automated screening of ambulatory care have been developed in Hawaii[2] and in Utah[3].

Criteria have been developed for far fewer ambulatory conditions than for hospital diagnoses. Empiric norms for the average frequency of visits by condition have not been developed due to the lack of adequate, representative data.

A major problem in ambulatory review has been the lack of an adequate source document describing the care rendered in relation to the patient's problems. The correction of this problem has been approached by adding additional items to claims form (New Mexico, Utah), by developing an office encounter form for widespread use (Portland, Oregon)[4], and by having trained personnel abstract office records (Hawaii).

Most programs studying ambulatory care recognize the value of and encourage the use of problem-oriented records. Their advantages rest on the fact that much ambulatory care relates to patient problems prior to the establishment of a proven diagnosis. Furthermore, obligatory reporting of ambulatory tests and treatments in relation to the instigating problem would significantly clarify evaluation when multiple problems are being treated or studied. An alternative to this approach would be the identification of commonly clustered problems and the development of appropriate criteria for the entire cluster.

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[1] *New Mexico Ambulatory Care Program*. Work in progress. Developed by the New Mexico Foundation for Medical Care of the New Mexico Medical Society.

[2] *Ambulatory Program* of the Hawaii EMCRO sponsored by the Hawaii Medical Association. Work in progress.

[3] *PACE.* Work in progress. Developed by the Utah Professional Review Organization of the Utah State Medical Association.

[4] *Multnomah Foundation for Medical Care Ambulatory Care Program*. Work in progress. Developed by the Multnomah EMCRO of the Multnomah County Medical Society (Portland, Oregon).

Clearly, the sophistication of ambulatory review lags far behind hospital auditing. Lack of a source document for reporting, lack of centralized reporting, lack of total reporting, and a dearth of appropriate criteria and defined outcomes have all contributed to the tardy development of ambulatory audits.

Nevertheless the methods to develop normative criteria for quality care exist; the means are present to generate empiric norms for the frequency of visits based on adequate reports from a representative population. Such criteria and norms will need to be newly developed in multiple areas of the country. The effort required is not likely to be invested until more adequate ambulatory reporting methods are available which make productive audits possible. These developments will not occur rapidly. Nevertheless, it will be possible for PSRO's to store as much ambulatory care data as possible. Despite initial inadequacies this will be a significant step towards total reporting and analysis of each regional health delivery system.

In summary, simple audits of ambulatory practice, such as the frequency of visits and the relevance of tests and treatments, can be conducted by retrospective analysis of claims forms or encounter documents. Both will require abstracting and automated comparison with explicitly developed criteria. The frequent presence of problems rather than diagnoses, in office practice, and the multiple problems often encountered, can be approached by:

(1) Encouraging problem-oriented records;

(2) Listing tests and treatments in relation to specific instigating problems; or

(3) Cluster analysis of commonly associated problems.

A number of local criteria and norms for ambulatory care and some examples of automated claims review, encounter reporting, and encounter abstracting now exist in selected areas. For the further development of ambulatory reviews, there is a need for:

(1) Expansion of the data available on claims forms.

(2) Central collection of claims forms and encounter documents from multiple intermediaries.

(3) Expansion and refinement of local criteria for frequency of visits and quality of care for common problems, diagnoses, and clusters of problems or diagnoses.

(4) Development and implementation of automated audits.

(5) Development of effective outputs, by educational or non-educational methods, to implement the audit findings.

## D. PATIENT AND PROVIDER PROFILES

Central claims and encounter reporting, plus the rapidity of computer processing, make available on-line access to consumer and provider profiles. Such profiles are simply a listing of all recent claims for an individual patient or by a specific provider. The longitudinal dimension, however, permits the identification of patterns which might not be evident from a single claim, or corroborates the recurrence of a problem identified on a single claim.

The on-line retrieval of longitudinal consumer profiles is now a reality in New Mexico[1], for Medicaid patients, and will soon be available for both patients and providers there and elsewhere. Criteria, in the form of empiric model practice patterns, are being developed in San Joaquin[2] and elsewhere. Patient profiles may be used by trained reviewers to aid their application of judgment. Physician profiles could serve as an approach to provider certification.

Clearly, further developments in this area are dependent upon access to total health service information for a defined population. At present such information is largely limited to the beneficiaries of Medicare and Medicaid, and to those enrolled in prepaid group practice. Further expansion of Federal health programs, and simultaneous efforts to centralize or pool claims reports, will increase the number of patients on whom nearly total health service data will become available to permit the development of meaningful profiles.

Expansion of presently available criteria will be needed to take advantage of these developments. Model treatment plans for more conditions, locally developed in many areas, will be required. Replication of the New Mexico methodology for the storage of data and the rapid retrieval of patient or physician profiles will be needed. Finally, it will be desirable to automate the application of model treatment plans to the review of patient and provider profiles. This will require new computer programs whose development has not yet been started.

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[1] Hospital Admission Precertification Program (HAPP), op. cit.

[2] *Model Treatment Plans*. Work in progress. San Joaquin Foundation for Medical Care of the San Joaquin Medical Society.

In summary, computerized storage can be accomplished for all reported data describing patient care, identified by unique patient numbers, to permit the ready development of longitudinal profiles of patient use and physician practice.

A limited number of model treatment plans (longitudinal criteria) are currently available in selected sites. A model for on-line automated retrieval of patient profiles has been developed in New Mexico. There is a need for:

(1) Expansion and refinement of local model treatment plans;

(2) Replication and refinement of automated profile retrieval;

(3) Automated comparison of model treatment plans with patient profiles; and

(4) Development of unique patient coding numbers permitting the identification and retrieval of longitudinal profiles.

## E. CONSUMER SATISFACTION

Peer review, by definition, has been professionally oriented. There is no reason to believe that the consumers of medical care have the training required to evaluate the technical proficiency or technical appropriateness of medical services. It has been said, "it is a sin of vanity to believe the praise of grateful patients. They are the poorest judges of medical talent. . . Beware the praise of an honest admirer who has insufficient knowledge and background to judge your skill."[1]

Nevertheless, patients do make judgments which influence their compliance with recommended medical regimens and whether or not they return for further care. Patients are competent to make judgments about the non-professional aspects of medical care such as cost, convenience and personal satisfaction. These factors, and patient judgments concerning them, often determine whether or not adequate care is actually delivered to the population.

For these reasons, despite a lack of unanimity, most of our panel believed that studies of consumer satisfaction should be an element of the general review envisioned by P.L. 92-603. Studies of consumer satisfaction with medical care, as evidenced by increased patient understanding of disease, compliance with medical regimens, rate of return for treatment, and specific opinions gathered by survey, have been conducted by various behavioral scientists. Such studies are currently in the realm of research. They have not been significantly implemented in any large-scale medical care appraisal system but could be conducted or commissioned by PSRO's on a sample basis.

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[1] Col. Robert H. Moser M.C., U.S.A., *Medical Opinion and Review*, Vol. 4, No. 2, February, 1968.

In summary, multiple sample studies, concerning consumer satisfaction, can be conducted by PSRO's to develop appropriate mechanisms for public accountability.

Research techniques for the study of consumer satisfaction have been developed by behavioral scientists. There is a need for:

(1) Application of these techniques by PSRO's on a recurrent, sample basis; and

(2) Local development of criteria or performance standards for consumer satisfaction.

## F. REGIONAL MONITORING

Excepting the studies of consumer satisfaction, the review programs discussed thus far have a managerial perspective focusing on the units of production (hospitals, nursing homes, and physician offices). An epidemiologic perspective would focus on the population served.

Effective regional studies of health services delivery can be conducted by PSRO's. To accomplish this, the individual services reported by each provider must be identified by a patient characteristic such as home location, age, sex, race, or socio-economic status. Aggregate data from all providers can be reassembled in terms of the population served, and expressed as population based rates per 1,000 or 100,000 persons served or at risk. Cost and utilization rates, on this basis, can be developed in toto and for specific common diseases for the entire region, and for specifically defined subpopulations.

Regional hospital abstract systems, and the nursing home data system, previously discussed, could provide the PSRO with total institutional information for its designated area. Data concerning ambulatory care, however, will initially be limited to the beneficiaries of Federal programs and the members of prepaid groups. Nevertheless, the latter should still be collected and compiled as a step towards total reporting.

Statistical indices will provide the PSRO with an overview of regional practice, to permit monitoring the impact of other programs and the identification of specific problem areas for further in-depth study. It is very important, however, for the PSRO to collect and aggregate medical care data both on a population and a provider basis. This simultaneous approach will permit an identification of the source of any detected problem for further study.

The statistical indices which each PSRO should monitor, include:

(1) *Utilization of institutional services*
Population served and at risk

(2) *Cost of institutional services*
Population served and at risk

(3) *Reported ambulatory utilization and cost*
Population served and at risk

(4) *Distribution of institutional diagnoses*
Population served and at risk

(5) *Mortality, available morbidity, maternal mortality and perinatal mortality*
Population at risk

For all services,
component services,
and common diseases

Population based utilization data may be linked with other bodies of population based data such as mortality and morbidity to permit some limited outcome evaluations within the region. The incidence rates of certain diseases, which represent inadequate intermediate outcomes or undesirable complications, can be studied from this data. The use of perinatal mortality rates to validate the processes of prenatal care, and the incidence of rheumatic fever to evaluate the care of streptococcal pharygitis are examples of such approaches.

The analytic and statistical techniques for regional monitoring are the classic tools of epidemiology. Their specific application to this function, and a better understanding of their significance, would rapidly follow the availability of centralized regional data.

Existing methods need to be extended, and new instruments developed to assure access by each PSRO to:

(1) Total hospital discharge reporting through a regional abstract system;

(2) Total nursing home reporting, through a regional nursing home data system;

(3) As much ambulatory data as possible by central collection of claims reports and encounter documents from multiple sources;

(4) Demographic data from the census;

(5) Vital statistics from the local public health departments; and

(6) Institutional facilities data from regional health planning agencies.

In summary, each PSRO should have access to total institutional reporting and as much ambulatory care data as possible and assemble both population and provider based rates for the utilization and cost of service and for the incidence of specific diagnosis. These rates should be reported for the population served and for the population at risk and used to monitor the processes and some outcomes of the regional health delivery system.

Research techniques for the epidemiologic study of health services delivery, on a regional basis, now exist. There is a need for new guidelines to promote:

(1) Central collection of provider and population based utilization and cost data by the PSRO; and

(2) Application of research epidemiologic techniques to monitor the health delivery system in the designated area of each PSRO.

## PSRO DISTRICTING CONSIDERATIONS

P.L. 92-603 requires the Secretary to establish appropriate areas throughout the country by January 1, 1974, and at the earliest practicable date, designate a qualified organization as the PSRO for each area.

Significant problems lie submerged beneath this seemingly bland requirement. Logically, districting should be determined by a rationale related to the proposed functions of each PSRO. This would adhere to the modern architectural adage of form following function. Lacking such a rationale, it is quite probable that PSRO functions will be constrained and in part dictated by districting, or to follow the analogy, function will be forced to accommodate to form as it so often must in poorly designed buildings.

Furthermore, districting confronts the Secretary with a maze of conflicting and competing local geo-political aspirations. Powerful central cities seek separation from their states and dominance over the immediate adjacent territory. Growing suburbs seek independence from central cities for the very reasons which prompted the suburban migration. Rural areas distrust both the cities and the suburbs and jockey for an independent political voice responsive to their unique needs. The ghettoes and barrios of the central cities similarly perceive independent control as the only means to meet their real and special needs.

The geo-political conflicts described above are common to all public endeavors, including health. Districting, in the health field, is further complicated by inter-agency and inter-institutional rivalries. The hospital associations cautiously protect themselves against the medical societies and everybody fears further inroads by academia. Large hospitals try to dominate small hospitals and the latter fiercely protect their independent prerogatives.

The sensitive nature of the districting issue was evidenced throughout our panel's consideration of PSRO organization and relationships. We were constantly forced to return to districting issues and to structure alternatives for other issues in relation to specific districting alternatives.

Substantive districting considerations are presented below under the headings of:

- Districting rationale
- Districting mechanics, and
- Districting precedents.

## A. DISTRICTING RATIONALE

### 1. Scope

PSRO could be implemented, en masse, by nearly simultaneous development in almost all areas of the country so as to provide a center for review of each eligible beneficiary. Alternatively, PSRO's could be implemented only in those areas with necessary resources and pertinent interests and allowed to grow by expansion and replication throughout the country.

These two alternatives impose different requirements on districting. The former approach requires districting, in relation to physicians, institutions, or populations, throughout the country so that all areas are covered. The latter removes the constraint for total coverage and permits inclusion of the local ability to perform PSRO functions as one of the districting criteria.

P.L. 92-603 implies districting of the entire country. More importantly, the discussions of the Senate Finance Committee leave little doubt concerning their desire for widespread implementation of PSRO. Our consulting panel was concerned that the requirements for PSRO implementation exceed the current state-of-the-art and the resources of most areas. We would have preferred slower, more evolutionary implementation. However, we recognized that the intent of the law precludes this as an alternative for districting. Clearly, districting must include the entire country. The quality of local resources for PSRO implementation will be evaluated during the process of contract negotiation, but will not significantly influence districting.

### 2. Geographic vs. Non-Geographic Districting

Generally, districting implies the division of a map along geographic lines. Nevertheless, the legislative emphasis on provider participation and the delegation of review to qualified institutions suggested an alternative to at least one member of our panel. Might groupings of providers or participating institutions serve to define the districts?

Were all the providers and institutions in an area to be so designated, then this approach would become geographic with only the difficulty of defining the outer boundary of their collective service area. If only some providers and institutions are involved, then the PSRO program would serve some but not all of the beneficiaries of the Social Security Act living in that area. Should multiple PSRO's be designated to serve the same limited geographic area, the confusion of responsibility and reporting lines would become chaotic.

Furthermore, one of the major functions of PSRO, as previously defined, is the collection of "population based" medical service data. This requires the aggregation of service reports from all providers, and precise geographic boundaries in order to define the appropriate demographic denominators.

Despite its consideration, we do not believe that a non-geographic basis for districting is viable, nor do we believe that it was intended by the legislation.

### 3. Size

In his testimony before the Senate Finance Committee[1] Senator Bennett stated that each PSRO should include a substantial number of practicing physicians in that area, generally 300 or more. Applying the national ratio of physicians to population, this represents a minimal service area of approximately 250,000 persons. Experience with EMCRO demonstrates only one program this small (Albemarle County, Virginia). This program is indeed a manageable research model. Its cost effectiveness as an operational PSRO has not been demonstrated, however. There is reason to believe that PSRO's should be somewhat larger to be cost effective. Certainly 300-500 physicians and a 250-400,000 population represent a probable minimum size for each PSRO.

While it is possible to so estimate the minimum size for a prospective PSRO, its maximum size is less definable. Conceptually, maximum size should be a function of managerial efficiency and effectiveness. In part, this will depend upon the degree to which each PSRO delegates review responsibility to qualified institutions. A current example of larger size, without apparent loss of efficiency is demonstrated by one of the funded EMCRO's (Georgia) which includes 4,000 physicians and serves a population of approximately 4,000,000. Unfortunately, this example performs some, but not all, PSRO functions. Many Regional Medical Programs served ±4,000,000 people and up to 6,500 physicians without the need for significant subdistricting. The inexact parallel between RMP and PSRO functions detracts from the example. Assuming a size up to 4,000,000 people, however, PSRO areas could encompass all but the five largest Standard Metropolitan Statistical Areas (SMSA's) in the United States.

It may become necessary to develop administrative subareas, when an otherwise rational PSRO becomes too large, as in the five major metropolitan centers (SMSA's) with populations over 4,000,000, which are described in the following Table IV.

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[1] Congressional Record, January 25, 1972.

## TABLE IV
## SMGA's OVER 4,000,000

| SMSA* | Population – April 1, 1970<br>Total | Rank |
|---|---|---|
| New York, New York | 11,529,000 | 1 |
| Los Angeles – Long Beach | 7,032,000 | 2 |
| Chicago | 6,979,000 | 3 |
| Philadelphia – New Jersey | 4,818,000 | 4 |
| Detroit | 4,200,000 | 5 |

Based on population size, physician distribution (clustering) and hospital origin studies, it may be both necessary and feasible to divide each of these five (5) SMSA's into a number of smaller, more manageable, PSRO subareas, with a "central" PSRO given the responsibility for coordination of the entire metropolitan area. Alternatively, multiple PSRO's could be designated for these large SMSA's providing they all use a common data set and provision is made for the free exchange of data throughout the medical service area.

From these considerations, it would appear that the lower and upper limits for PSRO size would be:

| | Lower Limit | Upper Limit |
|---|---|---|
| Physicians | 300-500 | Function of managerial |
| Population | 250,000-400,000 | efficiency and effectiveness |

### 4. Medical Service Areas (Watersheds)

A more fundamental districting consideration relates to medical service areas or medical watersheds. Ideally one PSRO should serve each self-sufficient medical service area. A medical service area may be defined by geographic boundaries within which most of the medical needs of the population are met. Medical service areas always include at least one medical school or a major medical center. They usually center about larger metropolitan areas (250,000 or more) and include the surrounding rural areas, sometimes encompassing whole states or even groups of thinly populated states. Medical service areas provide a fundamental rationale for districting since they generally define communities of physicians, a commonality of practice patterns, and the geographic boundaries for interrelated health data collection.

The issue of how rural practice is reviewed relates to medical service areas. There are two distinct alternatives: (1) the inclusion of rural areas in the adjacent metropolitan review area; and (2) a separate and distinct rural PSRO. The first option increases the size of the "metropolitan" PSRO but, more importantly, is consistent with existing patterns of medical service. The second option is less desirable since it professionally isolates the review of rural practice from the urban setting upon which it partly depends. This latter option is also in conflict with recent court decisions which apply national or broad regional standards of care to each individual case, regardless of location, based on the presumed ease of communication and transportation which now exist.

Medical service areas or watersheds relate closely to other trade areas. They are determined partly by the availability of medical resources, partly by such convenience factors as distance and accessible transportation, and partly by the trading habits of each community. Medical service areas, and other trade areas for that matter, develop independent of and without regard to political boundaries.

Whole counties, or groups of counties, can be included in each PSRO district if the dependent rural areas are included in each major city PSRO. This respect for county borders will keep most medical societies intact, within an individual PSRO, since societies are generally districted by counties or county groups.

New England, where townships rather than counties, are the primary mode of political organization, is an exception to this general rule. Neither SMSA's nor medical societies are districted by counties in New England. PSRO districts need not follow county borders, in New England, since counties have little practical significance in that area of the country.

State borders present a greater problem. Many medical service areas or watersheds cross state boundaries. Notable examples include: New York City, Philadelphia, Cincinnati, St. Louis, Kansas City, and Memphis.

Practical considerations favor PSRO districts which lie entirely within one state. Many federal programs are implemented by the delegation of responsibilities to states. Most federal programs, excepting some regional commissions and the Regional Medical Programs, have been organized entirely within states. Specifically, Medicaid has been implemented somewhat differently by each state; Medicare accreditation has been conducted by individual State Health Departments; and Medicare intermediaries have been designated within states. Claims processing, upon which some PSRO functions may depend and to which all PSRO recommendations need be reported, will be conducted by different agents, using different rules, in different states.

These considerations favor confining PSRO districts within state borders. Medical service areas which cross state boundaries must, then, be served by more than one PSRO. In a related vein, the largest medical service areas may need to be served by more than one PSRO simply because of their size. Two alternatives are recommended for those cases, where multiple PSRO's serve a single medical service area:

(1) Contracting with each PSRO for review and appeal functions, only, and maintaining a single central agency for data collection and regional monitoring throughout the entire medical service area; or

(2) Contracting with each PSRO for all functions but mandating a requirement for common and compatible data and the free communication of data between all of the PSRO's within each medical service area.

Although the considerations already given may require intra-state PSRO districts, it is important to recognize the feasibility of inter-state PSRO districts. Professional review need not depend upon the input of claims forms. In fact, the ideal sources of data for professional review come from providers of care and not from financial intermediaries. Non-claims input data may include precertification applications, the abstracts of an on-site concurrent nurse reviewer, and the reports of hospital abstract systems. While each PSRO must report its recommendations to the intermediary responsible for claims processing, freedom from dependence upon an input of claims forms makes it possible to envision a single inter-state PSRO serving a medical service area which crosses state borders. Under these circumstances, each PSRO would make educational inputs in the state where the service was provided and reimbursement reports to the intermediary in the state where the patient is resident. Such a PSRO would be required to accommodate to two different sets of State Medicaid regulations and report to two different State Councils, but would have the unique opportunity to apply the common medical standards of the single service area to an entire metropolitan region.

## B. DISTRICTING MECHANICS

There are two polar alternatives to implement districting and a third which represents a compromise between the first two.

(1) The Secretary may designate specific geographic areas for PSRO's which cover the entire United States. This option burdens the Secretary with the need to understand local circumstances and appreciate local resources throughout the nation. More importantly, the rigidity of this approach creates the need to gather a voluminous amount of local level data at great expense and with time-consuming effort. In light of these constraints, this approach seems least appropriate.

(2) The Secretary may allow "local" or "regional" self-districting based on explicit criteria or guidelines which he promulgates. This approach puts the initiative in the hands of the applicant agencies, subject to review and approval by the Secretary. This option would not, in and of itself, assure total geographic coverage of the country.

(3) Given the somewhat independent constraints in the first two options, the Secretary may combine these two approaches; allowing local or regional self-districting in conformance with a "non-rigid" master plan to assure total geographic coverage. This third option offers the greatest flexibility to achieve successful implementation, and was favored by the consulting panel.

## C. DISTRICTING PRECEDENTS

There are seven major districting precedents which may be used singly or in combination as criteria to determine PSRO districts consistent with medical service areas and the size constraints discussed earlier. These precedents are listed below, in order of importance, as viewed by the consulting panel.

(a) Standard Metropolitan Statistical Areas (SMSA)

(b) Comprehensive Health Planning (b) Areas

(c) Hill-Burton Planning Areas

(d) RMP Areas

(e) Patient Origin Areas and Specialty Referral Patterns (Service Areas)

(f) County or District Medical Society Membership

(g) Hospital Association or Council Districts

SMSA's define potential populations for PSRO review. Since both physicians and hospitals tend to be concentrated in cities, SMSA's serve as a surrogate for the measurement of these medical resources. Data describing the SMSA's in the nation, according to the 1972 Statistical Abstract of the United States, are given in Table V.

## TABLE V

## SMSA'S IN THE UNITED STATES*

| 1970 Population Size | Number of SMSA's 1970 |  | Population, 1970 |  |  |  |
|---|---|---|---|---|---|---|
|  |  |  | In Each Size Class |  | Cumulative |  |
|  | In Each Size Class | Cumulative | Total (in 1,000's) | % of Total SMSA's | Total (in 1,000's) | % of Total SMSA's |
| Total SMSA's ... | 243 | N.A. | 139,419 | 100.0 | N.A. | N.A. |
| 3,000,000 or more | 6 | 6 | 37,710 | 27.0 | 37,710 | 27.0 |
| 1,000,000–3,000,000 | 27 | 33 | 42,946 | 30.8 | 80,657 | 57.9 |
| 500,000–1,000,000 | 32 | 65 | 21,936 | 15.7 | 102,593 | 73.6 |
| 250,000–500,000 | 60 | 125 | 19,761 | 14.2 | 122,354 | 87.8 |
| 100,000–250,000 | 92 | 217 | 14,973 | 10.7 | 137,327 | 98.5 |
| Less than 100,000 | 26 | 243 | 2,091 | 1.5 | 139,419 | 100.0 |

Source: Statistical Abstract of the United States, 1972, pg. 19.

SMSA's serve to define medical service areas. SMSA's over 250,000 would approximately meet the minimum size requirements for PSRO's as previously discussed. These 125 PSRO districts would account for 122,354,000 people or approximately 60 percent of the population. The remaining 17,064,000 residents of smaller SMSA's, and the 63,793,000 non-metropolitan residents (and their physicians) could be incorporated in the SMSA defined PSRO district on which they depend for all or part of their medical service.

Assuming an even distribution of the remaining population among the 125 PSRO districts defined by SMSA's over 250,000 minimum PSRO size would be 415,000 (or approximately 500 physicians).

Unfortunately, SMSA's over 250,000 cannot be used as a sole criteria for PSRO districting. There are a number of rural states which have only one or two SMSA's which are smaller than 250,000. Nevertheless, these cities (such as Portland, Maine) serve as the nucleus for a statewide medical service area. Such exceptions are easily recognized and would not increase the number of PSRO districts beyond 200.

CHP (a) agencies are coterminous with states. CHP (b) agencies, covering metropolitan areas, are most often coterminous with SMSA's and usually describe medical service areas. Hill-Burton planning areas, which are generally coterminous with CHP (a) and (b) boundaries, may provide another criterion for districting PSRO's.

CHP and Hill-Burton districts were originally designed as medical service areas. Political constraints sometimes produced imperfect implementation of this principle. Nevertheless, the data used to define CHP and Hill-Burton districts should be of use in defining medical service areas for PSRO districts.

Most RMP boundaries are coterminous with individual state borders and add little information for districting. In a minority of RMP's, boundaries were developed to include multiple sparsely populated states or a dense metropolitan population straddling state boundaries. These latter cases do provide information to help define pertinent medical service areas.

Definition of the SMSA "core" of each PSRO district is relatively easy from census data. Definition of the outer rural boundaries for each PSRO district is more difficult, particularly in those border areas which drain into two or more larger centers. CHP (b) and Hill-Burton boundaries, and other data which they could make available, will help define the outer boundaries for each PSRO district. Other pertinent data for this determination should include:

(a) Hospital patient origin studies,

(b) Specialty referral patterns,

(c) Membership in County or District medical societies, and

(d) Hospital Association or Council Districts.

# PROFESSIONAL STANDARD REVIEW ORGANIZATIONS
# (PSRO)

## A. CONTRACTING

### 1. Foundations for Medical Care and Alternatives

P.L. 92-603 requires the Secretary to establish appropriate areas throughout the country by January 1, 1974, and at the earliest practicable date, designate a *qualified organization* as the PSRO for each area. A qualified organization will be a nonprofit *professional* association, with voluntary membership, including a substantial number of the practicing physicians in the area (generally stated at 300 or more). Membership in the PSRO and service for the PSRO cannot be constrained by a requirement for membership in or payment of dues to a medical society. The qualified organization must demonstrate its professional competence to review health care services in a formal plan submitted to the Secretary.

A geographic basis for districting, the definition of a qualified organization, the prohibition against dues requirements, and the ability of physicians to veto a PSRO contract by poll (to be discussed in the next section) all suggest that most (if not all) successful PSRO applicants will be "medical foundations." Selected fiscal intermediaries and an occasional CHP or RMP, may have sufficiently intimate relations with the local medical community to be acceptable as an organizational sponsor for a PSRO. The staff of a large, dominant hospital (or a consortium of hospitals) might qualify and be acceptable. In most cases, however, the staff of an individual hospital, clinic, or HMO will not be sufficiently representative of each designated geographic area to qualify as the PSRO, but may conduct institutional review programs delegated to them by the PSRO.

The practical restriction of PSRO's to medical foundations, in most cases, has both advantages and disadvantages. The arrangement results from, and promotes, an attempt to gain medical cooperation. Peer review, by definition, depends upon peer cooperation. Furthermore, this approach has the support of the American Medical Association. Disadvantages include the potential conflict of interest, lack of medically related consumer and other health professional inputs, and potential restriction in the number of PSRO applicants or the possibility of no successful candidates in some or many designated areas.

### 2. Legal Implications and Timing of Polling Requirements

P.L. 92-603 provides that until January 1, 1976, the Secretary will be able to contract only with a qualified organization which represents a substantial proportion of the physicians in the geographic area designated. The Secretary is required to publish notice of his intention to contract with a specific qualified organization. Until January 1, 1976, at the request of 10 percent or more of the practicing physicians in a geographic area designated by the Secretary, the Secretary will be required to poll the practicing physicians in the area as to whether or not an organization of physicians which has requested to conclude an agreement with the Secretary to establish a PSRO substantially represents the practicing physicians in that area. If more than 50 percent of the practicing physicians in the area, responding to the poll, indicate that the organization does not substantially represent them, the Secretary will not enter into an agreement with that organization.

The legislative language describing polling is time-constrained prior to January 1, 1976. A poll prior to initial contracting, before January 1976, may be required. Repeat polling will not be required during the twelve months of an initial contract. Theoretically, one subsequent poll, prior to recontracting, might be required should this occur before January 1, 1976.

Clearly, the possibility of a poll prior to initial contracting and twelve months later with recontracting, will discourage all but the most "representative" physician organizations. One hazard is that this uncertainty may decrease the number or completely eliminate PSRO applicants in certain areas.

It was previously recommended that the Secretary allow self-districting for PSRO's within the framework of defined criteria and a non-rigid plan for geographic coverage. The necessity for a poll, should it be required, demands that the Secretary precisely district in order to determine the appropriate physicians to poll. Such districting, itself, may determine the outcome of the poll. For this reason, the use of "prophylactic" polls initiated by the Secretary is not recommended. Efficient contracting would be better served by:

(1) Required endorsements with the initial application to indicate representation;

(2) Administrative arbitration by the Secretary of competing or overlapping applications;

(3) Publication of an intention to contract resulting from (1) and (2); and

(4) Polling only when requested by 10 percent or more of the physicians involved.

### 3. Recommended Endorsements

Endorsements from involved professional societies, health agencies and institutions should be required with the initial application, as evidence of representation. Endorsements from the State or County Medical Society should be mandatory. Endorsements from the state hospital association, hospital planning councils, affected hospitals, nursing homes, and possibly HMO's would be optional. These endorsements will indicate a base of support for the applicant agency which might preclude the necessity for a poll or indicate the successful outcome of a poll should it be required.

## B. ORGANIZATION

The organization of each PSRO is not constrained by law, other than to:

- guarantee representation of the area physicians, and
- urge widespread physician involvement in PSRO functions.

The organizational pattern for PSRO's will undoubtedly vary. Nevertheless, certain common functions need to be met.

| Functions | Agent (or Equivalent) |
|---|---|
| 1. Policy | Board of Directors |
| 2. Management | Executive, Staff, Volunteer Committees |
| 3. Operations | Staff, Committees |

At this point in time little can be said with regard to management or operational functions. Some aspects of the policy function, however, warrant consideration. The Board of most medical foundations is appointed by the parent medical society. To the extent that most physicians belong to and participate in medical societies, this appointment mechanism promotes the mandated representation of area physicians by the PSRO.

Satisfactory PSRO function will probably depend on somewhat broader representation, including:

- physicians who do not belong to the local medical society;
- physicians who belong to small peripheral medical societies;
- osteopathic physicians;
- allied health professionals;
- health agencies and institutions; and
- the public.

Given the climate of the times, and the controversial political nature of PSRO, it seems likely that some significant representation for all these diverse elements will be necessary. The inherent issue is at what organizational level; Board or Advisory! Policy control of the PSRO has been given to physicians by virtue of constraints written in the legislation. Policy control, however, should be influenced by the larger health services constituency, through inputs at the Board level. Influential representation at the policy level should be provided by a carefully structured Board, regardless of the appointing authority, to promote both public and broader professional accountability by the PSRO. The alternative option is the use of an Advisory Committee. The major disadvantage of this approach is the relegation of non-M.D. representation to a non-effective realm.

## C. PHASING AND PROGRAM DEVELOPMENT

In addition to the minimum set of PSRO functions, described in an earlier chapter, it will be necessary to develop a logical, programmed methodology for the phased implementation of additional PSRO functions. These functions may include nursing home evaluation, ambulatory review, data linkage systems, studies of consumer satisfaction, and review programs for privately financed medical care. Pre-programming such implementation will require careful deliberation and full, voluntary cooperation from the various elements of the local health delivery system. Requiring a detailed developmental plan, will help promote such cooperation early in the life of each PSRO and prevent further segmentation of health delivery services.

## D. OPTIONAL AND NON-MANDATED SERVICES

PSRO's may choose to implement peer review of:

(1) Ambulatory care

(2) Privately financed medical care (Blues and Commercial Carriers)

At present, review of Federally financed ambulatory care is optional, and the review of privately financed institutional services is not mandated by the legislation. Careful review of only some medical services implies two standards of care with only one under careful scrutiny. Recent experience demonstrates the instability of a two-standard system.

- Ward and clinic services are now rejected by the poor who seek public funds to purchase private "one-class" services.
- Medicare mandated utilization review has generally been applied to all patients regardless of source of payment.
- Some Blue Cross Programs, such as Blue Cross of Northeast Ohio, have incorporated certain higher Medicare standards into their commercial contracts.

It is likely that legally mandated review for Social Security beneficiaries will influence the entire health delivery system in much the same way that improved hospital care for indigent patients promoted the present widespread demand for private hospital use.

The review of non-mandated services is initially dependent upon voluntary cooperation. However, experience has shown that federal regulations do have an impact on the private sector with a spill-over of effects that eventually become custom. Even without a legal mandate, P.L. 92-603 will promote the review of medical services in the private sector.

## E. FINANCING OF DELEGATED REVIEWS

Certain review programs will be delegated by each PSRO to qualified institutions or agencies. Many PSRO's will depend upon data inputs from Hospital Abstract Systems.

The costs for these delegated activities may be considered necessary for PSRO function and provided to the PSRO, directly from the Trust Funds, for disbursement to the operating agencies and institutions. Considering the power of the purse, this approach would significantly enhance the strength of each PSRO. Some members of the consulting panel favored this approach since it would more readily identify the observable direct cost of the review program.

Alternatively, these costs may be considered allowable items for reimbursement and transferred to the initiating institutions for collection through their regular receipts from intermediaries. This second option was favored by the balance of the consulting panel, since it provides a ready mechanism for joint public and private financing of review at the institutional level with a minimum of additional accounting requirements. This option need not dilute the control of the PSRO which would still have the ability to authorize or not authorize Federal payment for specific institutional review programs. This approach must be accompanied by adequate hospital cost accounting to identify the real costs of PSRO review.

## F. PSRO-EMCRO RELATIONSHIPS

Some current EMCRO's will undoubtedly become PSRO applicants. Future PSRO's may seek EMCRO funding for specific research or development projects.

There are two grey zones, inherent in the distinction between operations on the one hand and research and development on the other. These distinctions concern:

(1) The difference between evaluation research and program evaluation; and

(2) The difference between project development and the initiation of operational programs.

It is probable that perfect definitions of these distinctions do not exist and that the boundaries between operations and research will overlap. An obvious need for inter-program coordination at the Federal and local level is therefore suggested. Whether EMCRO remains a separate program, or is functionally consolidated into PSRO, one fundamental principle should guide its research activities; namely, that they be conducted in relation to the needs of the operational program.

## G. PSRO-PSRO RELATIONSHIPS

It is likely that no districting of PSRO's can perfectly accommodate to medical service areas; and that patients resident in the area of one PSRO will receive services in an adjacent PSRO area. This will be particularly evident in large SMSA's and metropolitan areas crossing state boundaries, if multiple PSRO's are required for these areas. These facts generate a need for the flow of information concerning patient services from one PSRO to another and for special PSRO-PSRO communication mechanisms and both common and compatible data sets when the required interchange is frequent.

## H. EVALUATION REQUIREMENTS

The use of public money for any new program demands that evaluation requirements be incorporated to estimate program impact. Regional monitoring, through Hospital Abstract Systems, which has been suggested as a minimum function, will provide some evaluatory data. An evaluation methodology, and common minimum reporting requirements, will be necessary to help assure the public accountability of the program.

It is important to include program monitoring as part of the operational programs. Collection of routine data could serve as the data base for evaluation of the national program as well as for the evaluation of individual PSRO's. Given the time constraints and financial considerations involved in developing a protocol for program monitoring and evaluation, it may be desirable to adopt the evaluation protocol now being developed for the EMCRO program. This protocol is applicable to PSRO evaluation with modest modification.

The *Protocol for the Evaluation of EMCRO* prepared by Arthur D. Little, Inc. for the National Center for Health Services Research and Development under the terms of Contract HSM 110-72-269 includes:

(1) *Program Monitoring*: organized narrative and tabular data to describe the activities of each EMCRO. The material included covers for each EMCRO:

- the region served (population, physicians, hospitals, nursing homes, and intermediaries)

- program organization (board, individual and organizational participants, staff, effort distribution, and financing)

- projects
- criteria

(2) *Research Models*: to evaluate the impact of each program or project on the quality of medical care and on the cost of medical service in controlled, quasi-experimental circumstances.

(3) *Comparison of Criteria*: methods to identify the differences between criteria sets developed in different sites; methods to measure the costs of criteria development; and methods to measure the cost of care which would be generated by perfect compliance with different criteria.

(4) *Test Sample Review*: preparation of a test sample of hospital charts to be processed at each site to check the completeness and accuracy of abstracting, the variable application of judgment, and the differences in conclusions when the review is conducted by different methods.

## PSRO STATE COUNCILS

P.L. 92-603 requires that in any state with three or more PSRO's the Secretary will establish and appoint the membership of a State Council which will include:

- One representative designated by each PSRO.
- Four physicians (two designated by the state medical society and two designated by the state hospital association).
- Four knowledgeable public representatives (two recommended by the Governor of the state).

Each State Council, and the PSRO's in states without a Council, will have an Advisory Group of seven to eleven members including representatives of health care practitioners, other than physicians, and hospitals and other facilities which provide Medicare and Medicaid services in the state. The Secretary will provide regulations to determine the manner in which the Advisory Group is selected.

The State Councils, where established, will:

- Review, comment upon, and transmit to the Secretary any reports received from the PSRO's concerning violations of the Program.
- Review any appeals to a PSRO decision involving more than $100.
- Coordinate the activities of, and disseminate information and data among, the various PSRO's in the state.
- Assist the Secretary in developing uniform data gathering procedures to insure efficient and objective comparison.
- Assist the Secretary in the evaluation of each PSRO.
- Assist the Secretary in developing and arranging for a qualified PSRO replacement, when necessary.

The legislation, then, explicitly defines when a State Council is required, its composition and appointment, and major functional responsibilities.

It is conceivable under the law that many states (those with less than three PSRO's) would not require a State Council. This would burden the one or two PSRO's in these states with the task of conducting required State Council functions and would complicate the appeals function. Further, it would place PSRO's with a State Council at a disadvantage by not having a direct channel to the national office. More importantly, since state governments have a financial interest in Medicaid (Title XIX), their formal input would be sadly lacking in those states without a State Council. Based on these considerations, the panel recommended the establishment of a State Council in every state.

An alternative to a State Council in each State was considered. Proximate states with common interests and few PSRO's may choose to share State Councils on a voluntary basis. Three likely possibilities might be the Mountain States, the Southwest, and Northern New England. Maine, New Hampshire, and Vermont, for example, are likely to each have one state-wide PSRO. Their medical problems and general attitudes are similar. Furthermore, there is a history of joint cooperative ventures. They may choose to share and jointly appoint a common multi-State Council.

## A. AGENCY

State governments do not contribute to Medicare financially, but do share current review responsibilities for this program. More importantly, state governments are responsible for the costs of Medicaid under varying matching formulae. These are potent arguments for a public State Council. The disadvantages of a governmental State Council include the lack of initiative and imaginative programming in most State Health Departments and medical hostility to more governmental intervention.

The responsibility for initiating a State Council depends to some degree on its locus. If governmental, its development could be requested by the Secretary and required by the Governor or his agents. If private not-for-profit a suitable sponsor need be identified. If the logic of PSRO sponsorship is followed, at the State level, the State Medical Society, or one of its subsidiary corporations, would be the prime candidate for sponsorship.

Because of the use of matching state funds for Medicaid, the panel agreed that there should be a significant state governmental input on the PSRO State Council. In the panel's opinion, the Council should include selected state governmental agents such as the Commissioners of Public Welfare and Public Health as well as the variety of non-state employees specified by P.L. 92-603.

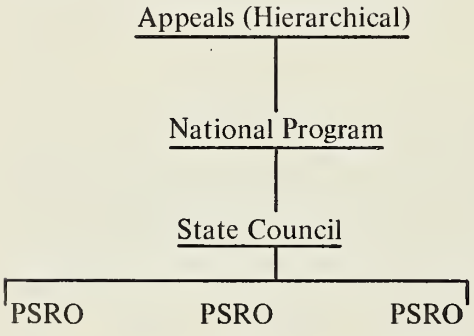
Despite intermittent Council meetings, many Council functions must be continuous. A secretariat will have to be provided by a) the Governor's Office, b) the State Health Department, c) the State Welfare Department, or d) by a not-for-profit private agency.

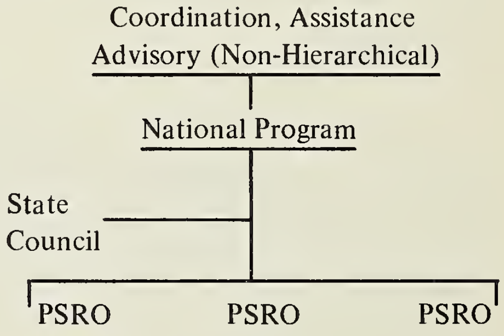
## B. FUNCTIONS

The specific functions of the State Council, including coordination, assistance, appeals, and advice, are explicitly defined in the legislation.

## C. ORGANIZATION

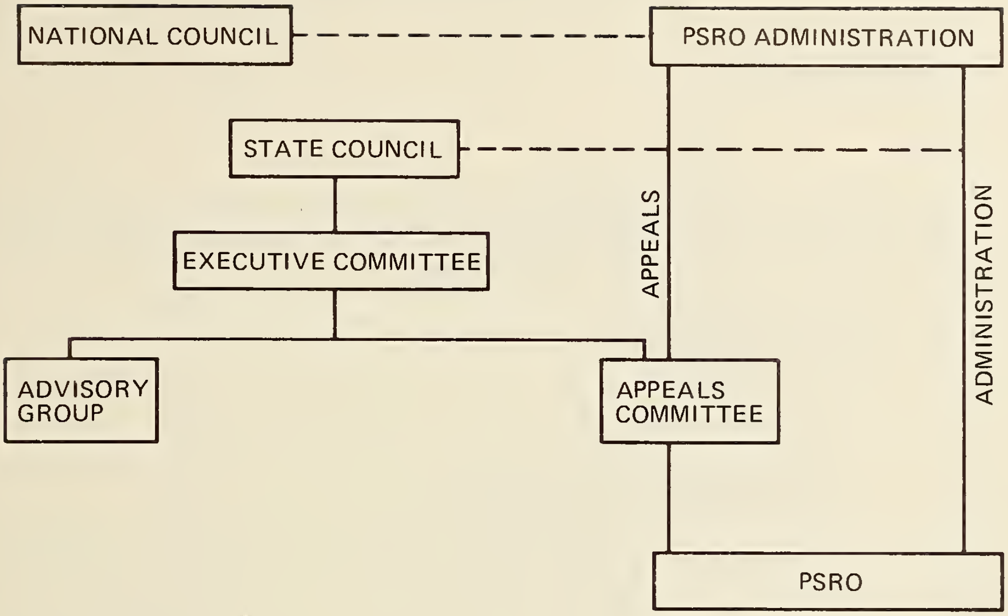
The organization of the State Council should relate to its functions. The appeals mechanism requires a hierarchical relationship with the State Council standing between the PSRO and the National Agency. Coordination, assistance, and advice do not necessarily require a hierarchical relationship. We visualize two separate, but not mutually exclusive organizational models for the State Council.





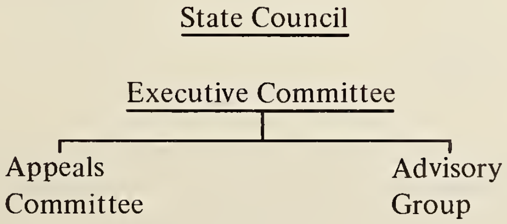
Management of the National Program would be facilitated by some limited number of intermediate reporting points, such as State Councils. Fifty Councils, however, would fail to increase efficiency; furthermore, the variety of policy inputs would introduce a notable lack of uniformity into the PSRO program. Alternately, efficient management of the Program could be developed by having PSRO's report through HEW Regional Offices or through regional "desks" at the national level. This approach would preserve the uniformity of the Program.

The necessity for hierarchical function by the State Council with regard to appeals was recognized. A non-hierarchical advisory role for the other functions of the State Council, however, was recommended. This relationship is diagrammed below:



## D. ADVISORY GROUP

The legislation is vague regarding the composition and function of the Advisory Group for the State Council. The issue is whether the Advisory Group is merely "window dressing" or a responsible vehicle for input from the regional health services constituency. The panel adopted the latter viewpoint and felt that the Advisory Group would be most effective as a standing committee of the State Council. The panel recommended expansion of the State Council membership, beyond the limited requirements of the law, to incorporate both the Advisory Group and a separate Appeals Committee. Under these circumstances, an Executive Committee would be responsible for coordination and assistance and special subcommittees for appeals and advice. The membership of the State Council would include the membership of the Executive Committee, Appeals Committee, and the Advisory Group. This composition of the State Council is diagrammed below.



## THE NATIONAL PROGRAM

### A. ADMINISTRATION

#### 1. Locus

Administration of the PSRO Program, at least theoretically, could be located in a number of different Federal sites, including:

(a) The Secretary's Office

- Under Secretary
- Assistant Secretary for Health
- A new Assistant Secretariat

(b) The Fiscal Agencies

- Social Security Administration
- Bureau of Health Insurance (BHI) of SSA
- Medical Service Administration (MSA) of SRS

(c) The Health Services and Mental Health Administration (HSMHA)

- Community Health Service
- A new and separate program within HSMHA

(d) A new Administration on a par with HSMHA

A schema, presenting nine possible options for the locus of the National Program, is given in Figure 3. The options are numbered and keyed to the following discussion.

a. The Secretary's Office

A locus in the Secretary's Office, whether at the level of the Under Secretary (1), the Assistant Secretary for Health (2), or a new Assistant Secretariat (3), would place the PSRO Program over both the health and fiscal arms of HEW. This

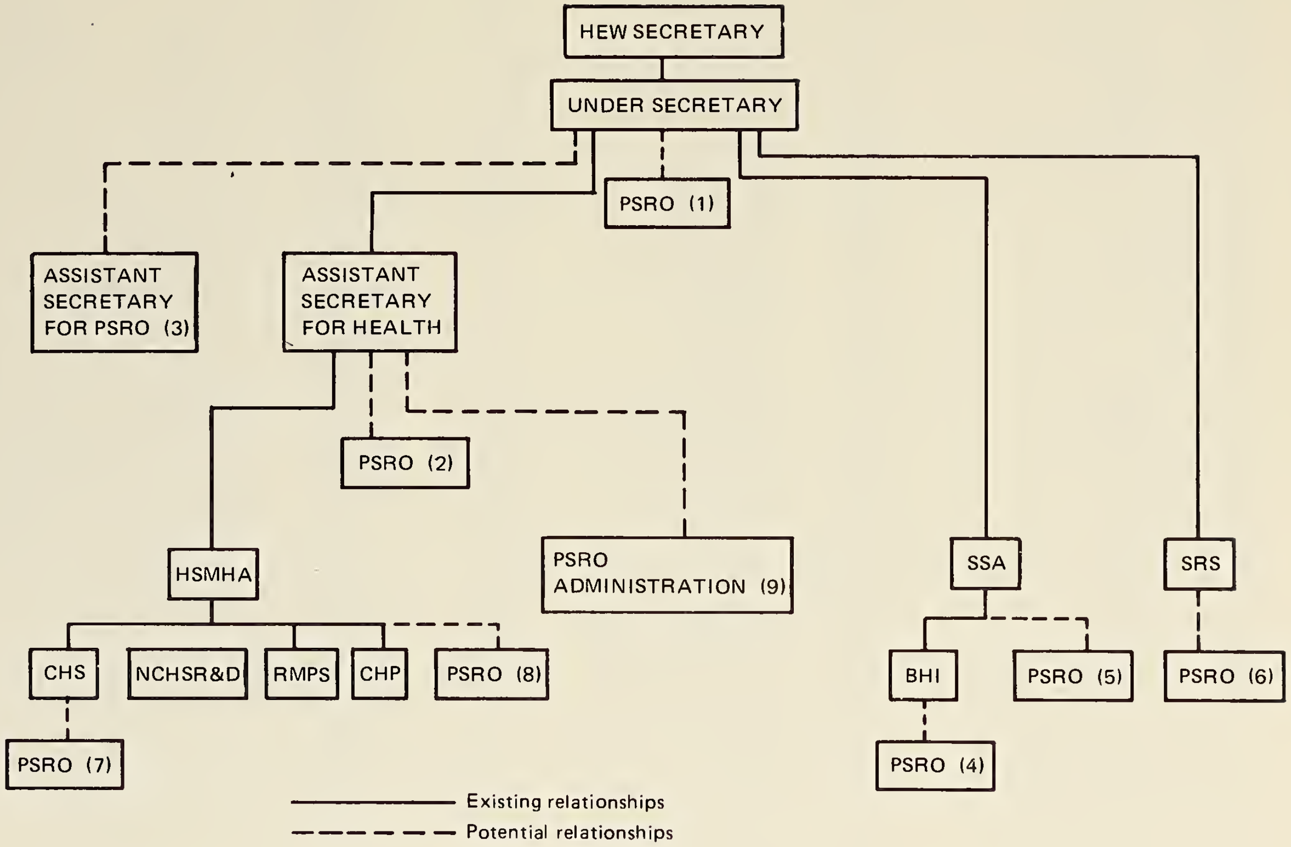


FIGURE 3 OPTIONS FOR THE LOCATION OF THE PSRO NATIONAL ADMINISTRATION

would solve the problem of split funding between MSA and BHI, and provide PSRO's with greater status in the Federal hierarchy. Location at one of these levels would provide national prominence. The effectiveness of the PSRO Administration, however, would be diluted by separation from the operational health and fiscal programs.

The most appropriate expertise within the Secretary's Office is located in the Office of the Assistant Secretary for Health. Lack of appropriate staff would have to be solved by major recruitment efforts; this problem, however, would be common to any locus for the new Program. The major disadvantage of the Secretary's Office is the absence of any precedent for housing an operational program at this level.

b. The Fiscal Agencies

The National PSRO Administration could be housed in the Bureau of Health Insurance (4), elsewhere within the Social Security Administration (5), or in the Medical Service Administration (6).

BHI, by virtue of its present regulatory responsibilities with regard to Medicare, has actively sought to implement the PSRO Program. There is, in fact, an inherent logic in the association of a regulatory program with the agency which has programmatic fiscal control. Nevertheless, two arguments militate against administering PSRO's in BHI.

(1) Since the Bureau is responsible for Medicare but not Medicaid, it could provide an association with only part of the Federally funded health program.

(2) More importantly, the Bureau is not well regarded by practicing physicians and organized medicine, who view it as an accounting rather than a professional agency.

This locus for PSRO Program control would guarantee less than whole hearted cooperation from the community of practicing physicians.

c. The Health Services and Mental Health Administration

The Health Services and Mental Health Administration provides the major repository of health delivery expertise within the Federal government. This fact strongly recommends it as a locus for the PSRO Program or defines a major advisory role. Within HSMHA, the Community Health Service could serve as the location for PSRO (7). Recent experience with CHP and RMP, however, has demonstrated the importance of a separate program to promote the status necessary to gain physician cooperation. Based on this consideration, it would be best to consider a separate Program, should PSRO's be located within HSMHA (8). Locus at these levels, though, would greatly diminish the national prominence and visibility of the Program.

d. A Separate Administration on a Par with HSMHA

The management of PSRO could be housed in a new Administration on a par with HSMHA (9). Such an Administration could house all of the operational facets of the PSRO Program and still report directly to the Assistant Secretary for Health. This approach builds on historic precedent and gives the new program the level of visibility which the Department has committed to Congress. The approach has the disadvantage of complicating the structure of the Department and shares with other approaches the need for new personnel.

The consulting panel addressed these varied options for the location of the PSRO Administration. Initial concern centered about the distinction between a small PSRO Administration charged with providing *coordination, leadership and policy direction* for activities in other Departmental components as opposed to the *consolidation* of all requisite PSRO functions in a single Administration. Tasks considered essential to the success of the PSRO Program include:

(1) Policy development and administration

(2) Technical assistance, and

(3) Program monitoring, evaluation, and research.

The panel felt that coordination, as a functional mode, had less chance of success than consolidation. This opinion was based on management expertise, the unsatisfactory history of prior Federal coordinative efforts, and the dilution of PSRO priorities in the face of dependence on other agents for implementation.

The panel was next concerned with giving the PSRO Administration the greatest possible visibility and status. While a locus within the Secretary's Office best satisfied this condition, no precedent was found for a consolidated operational agency at that level. Location of the PSRO Administration in BHI, as a HSMHA Program, or within a HSMHA Program was not considered sufficient visibility.

For the reasons given, the panel recommended administrative consolidation of all major PSRO functions in a new Administration (on a par with HSMHA) reporting to the Assistant Secretary for Health. This option, number (9) on the previous schema, was viewed as the best compromise between the conflicting demands for consolidation and visibility.

The recommended solution does not obviate the need for liaison with the fiscal agencies (BHI and MSA) both for information purposes and to provide the funding for PSRO field operations. These relationships are described in Figure 4.

### 2. Functions

The functions of Federal administration are relatively clear cut, following from the requirements of the legislation and the models of prior national programs. They will include:

- Guideline preparations,
- Districting,
- Selection and funding of PSRO,
- Technical assistance to PSRO's,
- Central data collection,
- Evaluation, and
- Support for the National PSRO Council.

## B. NATIONAL COUNCIL

### 1. Organization

The composition of the National Council is specified by the legislation. It will consist of 11 members (including the chairman) all appointed by the Secretary. A majority of the members will be recommended by national organizations representing physicians, but the Council will include physicians recommended by consumer groups and other health care interests, as well. All members will be physicians of recognized standing and distinction in the appraisal of medical practice.

The role of the National Council vis-a-vis the Administrative Agency for PSRO needs to be developed. Will the National Council serve in an advisory capacity or have administrative authority over the Federal Agency? Existing models, developed at NIH and later used by HSMHA, utilize such Councils to:

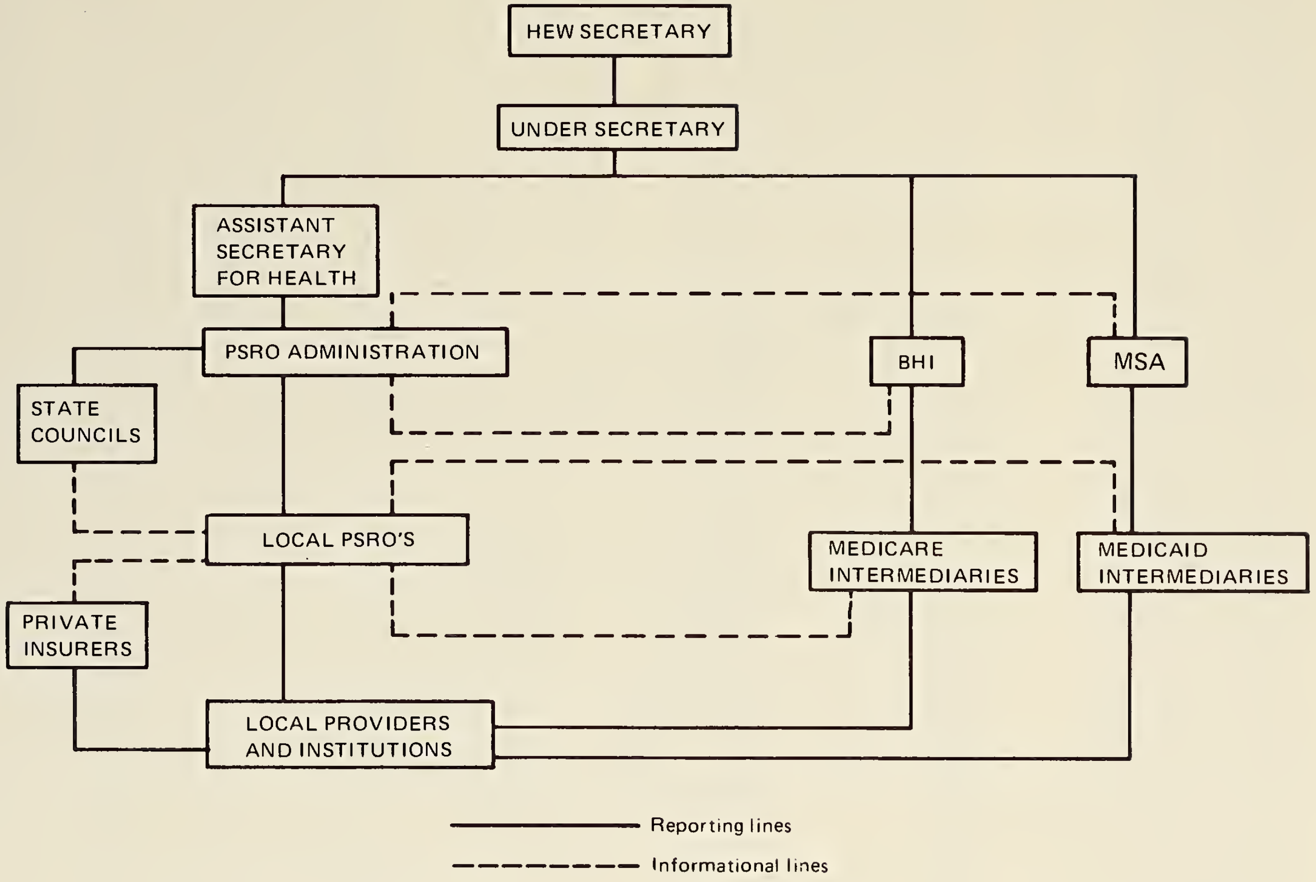


FIGURE 4 PROPOSED PSRO RELATIONSHIPS

- Evaluate and help determine Agency policy, and
- Select the most qualified applicants for approval and renewal of funding.

This common mode for National Councils is most likely. Given the existing precedents and recent policies set for the Executive Department, the National Council will serve an advisory role without line authority over the PSRO Administration. Clerical and executive support will be required and should be provided by the National PSRO Administration.

### 2. Functions

The major functions of the National PSRO Council are specified by the legislation. The Council will:

(1) Advise and assist the Secretary in the administration of the Program.

(2) Prepare and distribute regional "norms," with periodic revisions, based on a review of appropriate and adequate data.

(3) Provide technical assistance in the utilization of such norms of care and treatment.

(4) Review the comparative performance and effectiveness of State Council's and PSRO's.

(5) Recommended measures to improve the Program.

(6) Submit an annual report to the Secretary and to the Congress.

Most of these functions are self-explanatory. The relationship between the National Council (or the PSRO Administration) and each PSRO with regard to standard setting is a critical issue, however. The legislation alternately states that standards will be determined from regional data, and that standards will be developed, updated, and explained by the National Council. The issue is the acceptability of national standards and the allowable degree of regional variation.

Since the source of data for standards must be regional, it is likely that standards will be initiated by local PSRO's. This probability is further enforced by observations in current EMCRO's, where locally developed standards were needed to gain physician cooperation. Local standards will be reviewed nationally. Significant deviations will require explanation. It is likely that any controversy between the National Program and its local operational arms will arise over this issue.

Given the critical nature of the issue, it is wise to examine quality and volumetric standards separately. Local quality standards will probably aim at optimum levels, if the experience of EMCRO is reproduced. National requirements for at least minimum quality standards will probably be easily met. Conflict between national and regional norms for length of hospital stay is more probable. The solution to this problem will be found in the judicious use of time and administrative negotiation between the PSRO Administration and each local PSRO. Local norms should be accepted initially and compared at the national level. Evaluation, administrative negotiation, and the dissemination of comparative data will gradually bring local norms in line with national standards.

## C. TECHNICAL ASSISTANCE

Given the shortage of Federal personnel, it is likely that the technical assistance provided to the PSRO will be obtained through contract services. Technical assistance will be conducted at four levels.

### (a) Demonstration Programs

Experience gained by EMCRO's or mature medical foundations, which have been shown to be successful, can provide suitable demonstrations. Visits to such operational agencies are an important form of technical assistance.

### (b) Manuals and Training Sessions

Time and personnel constraints, and primary dedication to an operational mission, limit the direct use of EMCRO's or Foundations for this purpose.

Program manuals can be prepared to describe the organization and methods of existing programs. Training sessions, using these manuals, may be conducted on local, regional, and national levels. This approach would increase the dissemination of current EMCRO and Foundation data.

### (c) On-Site Consultation

Technical assistance will be required to aid developing PSRO's. This task will probably require contract services performed at the location of the prospective PSRO. As with HMO technical assistance contracts, consultants with the requisite skills and experience can be retained on a national or regional basis and made available to developing PSRO's.

### (d) Specific Tasks

Specific tasks such as the development of norms or the development of an evaluation approach can be conducted by contract. Consulting firms, EMCRO or Foundation staff, the American Medical Association and specific members of the academic community would be pertinent to these tasks or their subcomponents.

# PART II

# CERTIFICATION OF NEED FOR AND VOLUMETRIC APPRAISAL OF MEDICAL CARE

by

Elaine Israel

# CERTIFICATION OF NEED FOR AND VOLUMETRIC APPRAISAL OF MEDICAL CARE

by Elaine Israel

## INTRODUCTION

Conceptually, medical *need* must be clearly distinguished from *demand/want* in the medical care process. Traditionally, medical need has been professionally determined, although not always appropriately, while demand/want is determined, somewhat independently, by many socio-economic perceptions of a population. Early efforts by Ciocco, et.al. (41) attempted to describe need as being determined by pathological processes in the human organism, whereas demand is determined by the patient's intelligence (among other variables) to seek and obtain the services he needs. They went on to state that demand (economic) is measured in units of goods or services actually received by the consumer. Medical need is measured in units of service required (and utilized) for preservation of health and treatment of disease. While the need for care is initially certified by professional determination various methodologies also have been developed to evaluate the volume of services (volumetric appraisal) used in inpatient and outpatient settings. Typically, these have focused on length of stay reviews and numbers of visits, respectively. This paper will review these considerations within the following conceptual framework:

- Demand/Want for Medical Care
- Need for Care
- Certification of Need
- Methodologies for Certification
- Volumetric Appraisal of Utilization of Hospital Services

### Demand/Want for Medical Services

Jeffers, et.al. (158) defined the demand for medical services as that which arises out of consumers attempting to satisfy their psychologically formulated wants. Wants serve as the basis for the formulation of consumer tastes and preferences for goods and services. Economists traditionally assume wants, and consequently consumer tastes and preferences, as "given" and then proceed to explore the market consequences of any given set of tastes and preferences.

To satisfy wants, consumers enter the market place seeking to exchange money for those goods and services that are desired. However, since most consumers possess limited financial resources, and the goods and services they desire have positive prices, they cannot buy all the goods and services in the quantities they desire. It is assumed that consumers are rational and allocate available financial resources among alternative goods and services, purchasing that combination of them which yields the maximum satisfaction attainable, given their limited financial resources and the prices of goods and services in the market place.

Therefore, the quantity of medical services demanded by a given population depends on collective consumer wants (tastes and preferences) for all goods and services, prices of medical services, the prices of alternative goods and services, the size of the population, and the financial resources available to its members.

Based on these considerations Jeffers, et.al. (158) defined the economic concept of a given population's demand for medical services as: "A multivariate functional relationship between the quantities of medical services that its members desire to consume over a relevant time period at given levels of prices of goods and services, financial resources, size and psychological wants of the population as reflected by consumer tastes and preferences for (all) goods and services."

The specification of the demand function is an intellectual exercise in which the primary goal is to specify those factors that are likely to be important determinants of the quantity of services purchased by consumers.

Griffith (129) examines the concept of demand (quantitative rather than economic) as it relates to the allocation of hospital resources. He asks the questions: Where does demand come from, what is the underlying process which generates it, and what is important in a thorough description of the demand? For most hospital functions, demand comes from the decisions made by doctors about patients, but these decisions themselves are the result of a complex process.

Most of the services of hospitals are not sought directly by the patient. They are demanded as a part of a larger process through which the citizen seeks the treatment or prevention of some health problem. The demand for laboratory examinations, hospital admission, x-ray, and other services is not generated by the patient but by his doctor. An understanding of the process by which demand is generated must go back to the original demand for medical care. For measurable demand to exist for medical care, three factors must be present in the attitudes of the person seeking care (129): (a) he must be convinced he has a reason to seek medical care or at least advice; (b) he must be able to find the care he seeks; (c) he must be convinced the care will be worth the price he pays for it. Different individuals are likely to have differing viewpoints on whether to seek care in a given situation. A "persistent cough" may be reason to one man, but not to another. A two-hour bus ride and a three-hour wait may discourage some patients although it is a small matter to others. Finally, how much the patient is willing to pay, and how much a given service will cost him, depends on a number of factors which change from individual to individual. How much money the individual has, whether he has insurance coverage, or whether he is eligible for certain programs of free care will affect his demand for health care.

When the patient does decide to seek medical care, his normal course of action is to turn to a doctor. The doctor can request for the patient any of a number of services in the hospital, through the hospital, or independently of the hospital. Again, which services he actually demands depends upon a combination of factors, including his perception of what is wrong, the patient's financial and social position, and the availability of services.

Considering the quantity of health care rendered to a community of people leads to the development of a long series of questions which can be shown to affect the demand upon the medical care system. Taken as a set, the answers to these questions might describe why a given group of people used more or fewer health care resources, or received greater benefit from the resources than some other group. Many of the questions, however, are difficult in themselves, and further problems are introduced by the fact that the questions are interlocking. Griffith (129) suggests the following list of factors should be analyzed before reaching a full understanding of demand for health services in a community. These factors provide a background to understand both the demand for care and quality of care as rendered by a physician or in an institution in a specific situation.

(1) Attitudes of the people regarding illness and death, their interest in preventing death, and their willingness to tolerate illness. These attitudes include attitudes towards such matters as birth control, abortion, suicide, and aging.

(2) Economic level of the community and its ability to devote resources to the prevention and cure of illness and the prolongation of life.

(3) Environmental health problems such as the presence of endemic infectious disease, environmental pollution, and social, economic and genetic factors predisposing to mental and physical illness.

(4) Morbidity, the actual incidence and prevalence of disease.

(5) Methods of financing health care.

(6) Attitudes towards the seeking of professional health care, such as the interest of the population in seeking periodic physicals for early diagnosis, prenatal care, or care of well infants. Also, the attitude of the population towards the use of "quacks" and self-diagnosis and treatment.

(7) The availability of professional health care, including primarily doctors, but also other health-care professionals.

(8) The attitudes of physicians regarding the extent of diagnostic services which should be rendered, particularly in regard to early diagnosis or secondary prevention.

(9) The attitude of physicians regarding the selection of treatment, including attitudes towards the prolongation of life in chronic disease, and attitudes towards the selection of debatable therapeutic alternatives as for example, the use of psychoanalysis versus group therapy or chemotherapy.

(10) Attitudes of physicians towards the use of institutional resources, that is, the willingness of physicians to use hospital services on outpatient basis, as well as the tendency to admit patients to the hospital versus treating them in the home or in the office.

(11) The availability of institutional resources, including not only the number and variety of hospitals and related institutions available to the population, but also their convenience, attractiveness, and social, economic, or geographic restrictions which might be imposed on their use.

(12) The availability and adequacy of resources within the hospital or other institution for diagnosis and treatment.

Griffith (129) emphasizes that the doctor is the central figure in the medical care process. He alone has the legal authorization to both diagnose and prescribe for any illness. He directly controls a very large fraction of the interaction between the citizen and other professionals and completely controls the use of certain professions such as laboratory technicians. In addition, with only minor exceptions, a doctor is necessary to place the citizen in contact with any of the care institutions.

It is with these portions of the process, where the doctor draws upon the services of other professionals and the supporting facilities, that the hospital is directly concerned. In general, a hospital is an organization of manpower and facilities which is brought into the process of medical care by the doctor. The extent of facilities and services included in the hospital varies with the individual institution. At the least, the hospital will include an organized medical staff relationship with the doctor, employee relationship to most of the allied health professions and general inpatient facilities. At the most, as exemplified by the largest teaching hospitals, the hospital includes employee relationships with nearly all the health-care professionals, including doctors, and all major forms of facilities which deliver care. Regardless of how large the scope of activities of a given hospital, its roles are (a) to fill the demands for specific services made upon it by the individual doctors treating individual patients, and (b) to an increasing degree, to provide for the systematic review and improvement of the process by which the doctor discovers and meets the patient's needs. Griffith describes this process as the "medical care process." This will be discussed in greater detail in the following section.

### Need for Medical Services

Jeffers, et.al. (158) interpret a given population's need for medical services as a normative professional medical judgment concerning the quantity of medical services that its members ought to consume over some specified time period. They define a given population's health needs as: "That quantity of medical services which expert medical opinion believes ought to be consumed over a relevant time period in order for its members to remain or become as "healthy" as is permitted by existing medical knowledge."

They go on to state that an accurate specification of a population's "needs" for medical services requires perfect knowledge of the state of its members health, the existence of a well-defined standard of what constitutes "good health," and perfect knowledge of what modern medicine can do to improve ill (or below standard) health. It must be acknowledged that existing diagnostic procedures are not capable of providing perfect knowledge of the state of any population's, or even of an individual's, health. It also must be acknowledged that a clear-cut consensus as to what constitutes "good health" does not exist among health professionals. Further, it must be acknowledged that perfect knowledge concerning the potential of modern medicine to improve ill health does not exist since in many cases validated clinical findings verifying the curative effects of new drugs and procedures have yet to be accumulated. In spite of these difficulties, everyday health professionals are asked to estimate the needs for medical services of their patients; and frequently, as is well known, panels of medical experts are asked to estimate the needs for medical services on the part of the resident population of an entire state, region, or nation. Thus in spite of the difficulties of doing so, judgments as to the quantity of medical services needed are made as a matter of course by medical professionals.

Perhaps the most sophisticated effort to quantify need was the study undertaken by Drs. Roger Lee and Lewis Jones (178). Expressed in terms of physician-hours required per 1000 persons per year, these estimates were made by combining the expected incidence of disease (as determined from morbidity studies) with estimates of the amount of physician-time required for prevention, diagnosis, and treatment of each major disease according to prevailing standards of good medical practice. Comparisons were later made by Falk, et.al. (95) between the need for service as estimated by Lee and Jones and the number of services actually received for various illnesses by different income groups.

After review of the Lee-Jones study Ciocco, et.al. (41) raised two points about estimating health needs of a given population. Lee and Jones recognized certain shortcomings in their estimates, particularly the existence of disease unrecognized as such by the patient. An obvious example is the painless lump in the breast, often unnoticed, still more often observed but disregarded, until it has become an incurable cancer. The first problem encountered, then, is the necessity for complete data on the prevalence of disease in its broadest sense. There is at present no complete information of this sort, and its collection would necessitate periodic canvassing combined with medical examinations on a large scale.

Another problem in estimating need is the determination of the amount and kinds of the various medical services required for prevention, diagnosis, and treatment of each disease or group of diseases. Such estimates will vary from place to place and from time to time, since methods of treatment will differ among equally authoritative experts, and will also change with the advance of medical knowledge.

Jeffers, et.al. (158) emphasized that in many cases the population in question may view its own health needs as something other than what the medical profession views them. That is, the quantity of medical services that the population wants to consume may be different from the quantity of medical services the medical profession feels, in its opinion, the population's members need and ought to consume.

In this connection, they defined a population's wants for medical services as: "That quantity of medical services which its members feel they ought to consume over a relevant time period based on their own psychic perceptions of their health needs."

A given population's wants for medical services depends on cultural, religious, educational, and social status as well as on perceived physical or mental distress. As such, they are an important determinant of consumer behavior, i.e., a determinant of what economists call demand, a market phenomenon.

Jeffers, et.al. (158) elaborate on several reasons why the quantity of medical services a given population may want, may differ from the quantity of medical services that the medical profession thinks it needs. Certain members of the population may be reluctant to consume some medical services because of inertia or because their wish to avoid pain, suffering, or embarrassment which accompanies their delivery. Uncertainty concerning the potential benefits of certain medical services in connection with these considerations may be sufficient to convince others that they do not want them.

However, probably the most important factor responsible for the gap between wants and needs is consumer ignorance. Most consumers are ignorant of professional standards of what constitutes "good health" and are not fully aware of the extent and limitations of the preventive, therapeutic, and rehabilitative capabilities of modern medicine for improving their health. In general, most consumers do not recognize symptoms of bad health until they are manifest as pain, passage of blood, or other obvious abnormalities. Further, they usually defer seeking out advice concerning the state of their health, or enlightenment concerning the curative potential of modern medicine, until such symptoms are observed. Even upon entry into the health care delivery system, consumer enlightenment on these matters is usually restricted to knowledge concerning the specific illness which prompts them to seek out medical care.

As medical science progresses, more and more symptoms are recognized to be abnormalities associated with "bad health," and new and better means of curing illnesses are developed. As a consequence of imperfect knowledge, consumer wants may lag behind the advances in standards of "good health" and of the curative potential of medicine; and, as a consequence, a gap may develop between health needs and wants.

However, for some consumers in the population, not all of whom are hypochondriacs, current standards of good health and curative potential of medical technology are likely to be below what they would like. This cohort views its wants for medical services as something greater than the quantity needed or in some cases even available. The lower a given population's cultural, educational, and social status, and the more restrictive in terms of the consumption of medical services are its collective religious beliefs, the greater the gap between wants and needs. However, announcements in the news media concerning the development of new drugs and procedures capable of improving health, public service messages concerning the advantages of preventive health measures, and communication between the doctor and patient concerning the latter's health needs serve to increase the population's wants for medical services, assuming that its members believe what they read and hear. However, the extent to which these increased wants are translated into increased consumer participation in the market for medical services depends on certain economic considerations which are related to concept of demand which was discussed previously.

Griffith (129) attacks the concept of need from the standpoint of the medical care process which begins with the individual patient seeking the services of an individual physician. The initial decision to seek care is usually the patient's. All subsequent decisions are generally those of this physician, except that the patient may at any time terminate his relationship with his physician and break off the process. The physician makes his decisions based on his professional assessment of the total collection of patient's needs and wishes. The medical care process may involve no other individual or institution. In fact, for the great majority of the occurrences the doctor will not find it necessary to go much beyond the resources he has immediately at hand. As the patient's disease becomes more complex, the process becomes more complicated and the number of additional resources the doctor will need increases. The hospital, as the largest single collection of these resources, soon enters the medical care process.

When the patient presents himself to the physician, the doctor's first decision, usually made quite automatically, is whether or not he will accept the patient. In a few cases, the doctor may decide that there is no medical need or that he is unable to serve the patient and may discharge him from the process at that point. The patient is then free to initiate the process with some other doctor. After the doctor accepts the patient, his first job is to establish a probable diagnosis, which he does initially by careful interview and examination (history and physical). Many specialized diagnostic services are available to aid him in refining and extending this diagnosis. Laboratory and x-ray are commonly thought of, but there are, in addition, electrocardiography, electroencephalography, myography, thermography, and a growing list of others. The next decision raises the question of which diagnostic tests, if any, the doctor wishes to use. He may then either provide these services himself or order them from some outside resource such as the hospital. In either case, the process is diverted to the area of diagnostic services. After the information from the diagnostic test is returned to the physician, he may then use this information to order other tests. Thus, the process may involve several repeated episodes of diagnostic testing.

At some point the doctor decides that he has obtained as much diagnostic information as he needs and then proceeds to various therapeutic modalities. Here the doctor can select therapy based upon his knowledge of the diagnosis. It is possible that, despite the diagnostic tests, there is no therapy to be rendered. In this case the patient is discharged from the system. Otherwise the doctor may decide a specific course of treatment and may then call on other resources to supply the treatment. He may provide it himself as well. Here again the hospital is frequently the source of the service for the patient.

When the therapeutic service is ordered, certain results are expected, and the next step in the process involves the evaluation of whether or not these results were achieved. If they were not, the doctor returns to his diagnosis to review its accuracy and again considers what therapy should be ordered. Presumably, the selected therapies will eventually be as effective as was anticipated, and the process moves to the last decisional areas. Here the patient's needs are evaluated in terms of possible additional treatment and additional diagnoses. If it is indicated, the process moves back to a diagnostic or a therapeutic service. If no further treatment is indicated and no additional diagnosis found, the patient is discharged from the medical care process.

Griffith (129) summarizes the medical care process by purporting that it is governed by the patient and his individual physician and may or may not involve the hospital or any other institution. The hospital is frequently involved, however, and its points of involvement are at the provision of diagnostic services and treatment services. Often the total amount of hospital services which is required is great enough to warrant physically transferring the patient to the hospital and admitting him for a period of several hours to several weeks. It is not always necessary that this be done, however. Many hospitals provide limited quantities of service to patients on an outpatient basis or deliver them to the patient's home through a home care program.

The demand upon a specific service which results from a given patient's problem is obviously conditioned by a large number of more or less independently operating factors, ranging from social and environmental factors through patient-related, doctor-related and disease-related factors. He feels that two key conclusions result from this fact. The first is that "need," i.e., some medically determined condition, is neither a necessary nor sufficient condition for demand. "Demand" and "need" are two quite different measures which can (and should) be compared, but never confused. The second is that many of the factors affecting demand for a given service are chance or random factors, so that it is impossible to predict with certainty that a specific patient will need a service. Such a process is said to be "stochastic," that is, subject to random variation of some magnitude. The stochastic nature of demand and the difference between demand and needs have profound consequences for hospital resource planning. These problems can almost never be totally dropped from consideration in hospital management and health services evaluation.

### Relationship of Demand and Need

As previously stated, Jeffers, et.al. (158) felt that a given population's need for medical services, from the standpoint of the medical profession, relates to that quantity of medical services that expert medical opinion regards as available and necessarily rendered to enable its members to meet contemporary standards of good health. This concept of need is independent of economic considerations, such as independent of prices of medical services; financial resources, including insurance; and so on. In demonstrating a strict connection between demand and need, Jeffers, et.al. assume that a given population of health consumers is perfectly informed concerning contemporary standards of good health, the "health status" of its members, and the curative potential of modern medicine. They further assume this population exhibits no unusual abnormalities. Given assumed knowledge of contemporary standards of good health, the "health status" of each of its members, and of the potential of modern medicine to diagnose and treat illness, the hypothetical population has a very clear concept of the kind and amount of medical services it ought to receive over a given time period, say a year.

In this special case, the total quantity of medical services wanted on the part of this hypothetical population is equal to the quantity of medical services needed as defined by the medical profession.

Ciocco, et.al. (41) proposed that four conditions must be present to satisfy this equation.

They are enumerated as follows. First, the patient must not only recognize symptoms but must be aware of the necessity of examinations designed to disclose asymptomatic disease. Second, he must believe that consultation with a physician will not only help him, but will be the best value for his money; he may otherwise consult a naturopath, a druggist, or his grandmother! Third, one or more physicians qualified to treat his disease must be geographically and otherwise available and must be known to or found by the patient. Fourth, the patient must have the funds, from one source or another, to pay for the physician, for ancillary services and materials, and for the living expenses of his family if incapacitation cuts off his earning power.

Jeffers, et.al. (158) feel the major question that arises under these conditions is, will this population purchase all the medical services it wants? The answer is, probably not. The reason is, given limited purchasing power, the hypothetical population cannot purchase all desired quantities of the goods and services that its members want. Its members are likely to be aware of standards of need for food, clothing, shelter, recreation, as well as those pertaining to medical care. Since the collective financial resources of the population's members do not permit them to buy goods and services in the quantities necessary to satisfy all their wants, they are, in the aggregate, likely to strike some sort of compromise and consume less than wanted quantities of all goods and services, including medical services. However, members of the population would be happy to purchase desired quantities of those goods and services wanted if their prices were zero. Further, they hypothesized that collectively, members of the population will buy more of any particular goods or service, the lower its price relative to alternatives. Therefore, at positive prices for medical services, the population is likely to consume medical services in quantities less than its total wants. However, as prices of medical services approach zero, the quantity of medical services purchased will more nearly approximate the total quantity wanted, where in this special case, the latter is exactly equal to the quantity of medical services needed as viewed by expert medical opinion.

Jeffers, et.al. (158) assumed that the hypothetical population has perfect knowledge as concerns the health status of its members and the potential of modern medicine for improving it. They also assumed the members of the population to have limited financial resources and to have no unusual acute medical symptoms. In general, most consumers have imperfect knowledge of their state of health, contemporary standards of health care, and the potential that medicine has for improving it.

Any increase in information that a population receives concerning its health status, and what modern medicine can do to improve it, will shift its demand curve for medical services rightward (an increase in demand) or leftward (a decrease in demand) depending on how it affects perceptions of need for medical services. News of new procedures or increased knowledge of what are acceptable standards of good health are likely to increase consumer demand for medical services.

Similarly, an increase in financial capacity (increase in income, insurance coverage, and so on) tends to increase consumer demand for medical services.

Up to this point, they have not been concerned with unusual acute care needs and demands for medical services. Under the conditions assumed above, consumers may be assumed to act rationally and, rather unemotionally, to allocate dollars among available goods and services including ordinary acute, medical care services. The term "rationally," in this context, means that consumers on the basis of tastes and preferences, allocate dollars among alternative goods and services taking into account limited financial resources and the prices that are associated with all goods and services that are available. However, it must be recognized that human nature is such that people are temporarily insensitive to prices or tend to discount the problem of paying for their purchases when they feel that they need them badly enough.

Jeffers, et.al. state that, in an economist's eyes, disregard for prices and financial constraints and failure to weigh potential benefits in relation to costs, is to act irrationally. Yet, when people are in pain, are injured, or have other symptoms which disturb them, and when ignorant of the possible causes and consequences of these symptoms, they are prone to seek out medical services without careful consideration of the economic consequences of doing so. Under these conditions medical services are not postponable, people tend to be somewhat irrational in the economist's sense of the term, and the costs and financial implications of purchasing expensive medical services are temporarily forgotten or given low priority in the process of making the decision "to go to the doctor." Thus, when extraordinary acute symptoms are manifest, both consumer demand and needs may increase.

It is difficult to say just how far or in what way demand increases under these conditions. The more ominous the symptoms and the more consumers believe their lives to be endangered, the further the shift in demand. That is to say that if consumers perceive that their illness is a "life or death" matter, entails intolerable pain and suffering, or is potentially permanently disabling, crippling, disfiguring, and the like, demand is likely to coincide or even surpass actual medical needs. In such cases, consumers are likely to attempt to place life and limb in the hands of physicians, consume all quantities of medical services that are prescribed, and worry little about prices and limited financial capacity with which to pay for services received.

They emphasized that the majority of acute cases do not involve an intolerable level of pain and suffering or are not "life or death" matters; thus the times when consumer demand approaches or surpasses needs are rare.

Ellenbogen, et.al. (87) examine health need as it relates to demand in a slightly different context: social status and subscription to health insurance. They propose that health insurance has become a generally accepted means for meeting the costs of illness in the American society. One of the more common explanations of the subscription to health insurance has been based on the rationale that (a) the cost of medical care oftentimes is the greatest when the breadwinner of the family is least able to pay for such exigencies and (b) the family with little or no financial reserve is frequently unable to meet the economic catastrophe of prolonged illness. In other words, the rationale is based primarily upon the concept of health need.

Within this content, they presume that the individual's decision to subscribe to health insurance would increase with an existing need or an anticipated need. The underlying theory may be summarized in three propositions. Persons who subscribe to health insurance are either (1) those who already know they have a health need or (2) those persons who have certain characteristics which would lead them to believe that they might have a health need in the near future, while (3) those persons who conceive only of a remote possibility of having a health need would be the last to subscribe or would not subscribe at all.

However, they question the tenability of the "need" theory on the basis of the limited research available. While persons in high income and younger age groups subscribe to health insurance more often than those in low income and older age groups, they feel there is no indication that the former two groups have greater health needs. But whether or not the need theory may be rejected on the basis of this limited research is problematical, because one also finds that the relationships between income and health insurance subscription and those between age and subscription may have been reduced by recent trends.

The preceding discussion leads to the consideration of another theory to explain the acceptance of health insurance. This alternative theory assumes that status factors produce differences in life chances. That is, the higher the status, the greater the probability of goals being achieved and misfortunes being avoided. The theory of Ellenbogen, et.al. propose that persons with higher status subscribe to health insurance more than those with lower status, and that persons with very low status seldom, if at all, subscribe.

Based upon data collected from a sample of 150 full-time farm operators of a western New York county in 1956, they formulated two ad hoc hypotheses. They are: (1) subscription to health insurance is a function of health need; and (2) subscription to health insurance is a function of social status.

Testing of the proposed hypotheses required that the decision to subscribe to health insurance is made by the individual. In general, they proposed that farmers are more likely to meet this condition than are non-farmers. Although group insurance plans are available to some farmers (particularly through dairy cooperatives, in that county), subscription to health insurance plans was not a condition of employment as it is for many non-farm occupations. It was assumed that "group pressures," while not absent, operated less prominently at the time of this study in the decision to accept or reject a health insurance plan by farmers.

However, to test the two general hypotheses, several alternative explanations required consideration. First, health need and status factors may be positively correlated, in which case the two overlying theories are but different frames of reference for saying the same thing. Secondly, health need and status factors may be negatively correlated, in which case the theories are mutually exclusive; and finally, health need and status factors may be neither positively nor negatively correlated, in which case the theories could be supplementary; that is, the factors from the two theories could cumulatively contribute to the explanations. Either of the last two alternatives requires a testing of each of the two general hypotheses.

In summary, they reported that the relationship between health need and status was examined as well as the relationship of each to the subscription to health insurance of 150 farm operators. In three tests, health need factors were negatively related to status factors, and in three additional tests, there was no significant relationship. These findings indicated that in some ways health need and status are contradictory explanations, and in some other ways they could possibly be supplementary; but in no test did the two explanations appear to be merely two ways of saying the same thing.

In testing the two general hypotheses for the explanation of the subscription to health insurance, it was found that health need factors did not relate to health insurance in the expected direction, and actually suggested the converse. Succinctly, those who need health insurance most have it least.

Status factors did appear to explain in part the subscription to health insurance, and in combination they showed a consistent relationship. Persons with higher status more often subscribed to health insurance. Income, in particular, appeared to be an important factor in the controlled analysis. Therefore, it might be said that subscription to health insurance is more a function of ability to pay than of health need, as defined herein.

The controlled analysis indicated that further exploration might be made of an economic model. Obviously, the subscription to health insurance can be interpreted within the context of life chances, which is central to the theory of stratification. Since this concept includes the avoidance of misfortune, the ability to secure one's family against excessively high medical expenditures may provide a well-defined situation for testing the theory of life chances.

Griffith (129) views the conceptual processes of need and demand in three categories:

*Demand* is the sum of explicit requests for a given medical care service, either by the patient at the initiation of the medical care process, or by the doctor acting for the patient in the process of diagnosis and treatment. Some demands are implied by others according to convention or hospital policy. For instance, an admission to the hospital carries an implied demand for meals, nursing care, linen, etc., as indicated by the patient's condition and preestablished policies. Unless otherwise stated, these are treated as part of explicit demand.

*Unexpressed demand* is the demand for services which is not translated to explicit demand, usually because of resource shortages. Examples are demand for doctor's services which are not expressed because patients are aware of long waiting lists and requests for hospital admission not made because of crowded facilities, etc. Sometimes such demand is carried elsewhere, and sometimes it simply remains unexpressed and unmet. (Unexpressed demand can create serious forecasting difficulties, for its existence implies that historic statistics on output under-represent the true demand).

*Need* is a concept of health services required by a population to maintain it at a preconceived level of health. It differs from demand in that:

(1) It requires a subjective definition of the level of health, the services required, or both. The definitions are usually supplied by some medical authority or panel.

(2) It excludes those portions of both unexpressed and explicit demand which are unrelated to the concept of health level. For example, demand for hospital care among patients whose need is for domicilary services available in homes for the aged or foster homes would be excluded from a forecast of the need for hospital care.

(3) It includes levels of health care (for instance, preventive examinations) which may not be perceived as desirable by either the patient or the practicing doctor, and thus do not appear as either explicit demand or unexpressed demand.

Of these three concepts, explicit demand is the easiest to measure and is the closest to output statistics commonly available. Unexpressed demand becomes important in the planning of facilities, because it often converts to explicit demand when the barriers imposed by resource shortages are reduced. It should be noted that the existence of unmet need or unexpressed demand does not imply a change in demand unless the underlying factors preventing the expression of demand are altered. Need and unexpressed demand are merely predisposing factors to changes in demand, and should not be interpreted as automatic in their action. Need is measured only when agreement is established on its definition. Although the term has been commonly used in the past, (as in "bed need" for a given community), it is becoming less popular with the realization that there is sometimes little professional consensus to support a measurement of need in terms of gross processes like the medical care process or hospital admissions, and little practical chance that demand will conform automatically to the need once it has been estimated.

At present, Griffith (129) feels that one major use of "need" evaluations lies in monitoring the output of the various aspects of medical care services. He proposes that the doctor has a role in evaluating need as well as demand once the medical care process has been initiated, and that one dimension of the quality of care is its appropriateness. Specifically, the treatment of the individual case can be judged in the light of two questions: (a) Did this patient receive all the diagnostic and treatment services which good medical judgment indicates? (i.e., all he needs, as defined by some medical consensus.) (b) Were all the services received by the patient indicated by good medical judgment? (i.e., were all needed, again as defined by medical consensus.)

He summarizes the distinction between demand, unexpressed demand, and need, by describing six possible states in which a patient can be: (a) with need, without demand; (b) with need, with unexpressed demand; (c) with need, with explicit demand; (d) without need, with explicit demand; (e) without need, with unexpressed demand; and (f) without need, without demand.

Management data usually are derived from measurement of states (c) and (d) combined (explicit demand, with or without need). The statistics of output, which are commonly substituted for the unknown statistics on demand, most closely approximate the sum of these two states. Particularly in situations where available facilities are operated at capacity, output is likely to be a poor approximation of demand. In these situations it is important to allow for the existence of substantial unexpressed demand, cases (b) and (e). As consensus grows among both doctors and patients as to what constitutes "need", cases (d) and (e)--demand without need-- may be expected to decline in importance. At the same time, patients in case (a) who need care but do not request it will presumably perceive their needs and change their state to explicit demand.

### Certification of Need

In 1968, Kolb and Sidel (174) reported that as the demand for and the complexity of inpatient care increases and hospital beds become more and more expensive and difficult to obtain, the efficient use of hospital beds becomes increasingly important. The limitation of length of stay to the minimum necessary for good patient care is an important factor in the efficient use of beds. Length of inpatient stay in a general hospital for patients with acute diseases is influenced by many factors including: the nature and severity of the illness, the availability of appropriate facilities for transferring the patient after stability has been attained, the medical and social attitudes of the physician and patient, and the demand for beds in the specific hospital and community. They felt that cost considerations also enter into decisions on length of stay, with hospital stays being longer if third parties are paying the hospital bill and shorter if the patient is paying the bill himself. For this reason, control mechanisms on length of stay are usually built into any third-party payment plan.

They proposed two basic methods by which a third-party payer can attempt to limit hospital stay. One of the most frequently used limitations on length of stay by third parties is a definite time limit on the total number of hospital days for which the patient or the hospital will be reimbursed. This method is indeed very effective in limiting length of stay, but is extremely arbitrary. There is no distinction made between patients who would be benefited by longer stays and patients who no longer need the benefits of hospitalization. The other method of controlling stays is the establishment of a review of "medical necessity for continued inpatient hospitalization" after a given length of time. This method allows full consideration of the medical or social factors requiring continued hospitalization but is of unknown effectiveness in limiting stay in those cases in which further stay is unnecessary.

Public Law 89-97, Title XVIII, Part A, uses both of these methods: There was absolute limitation of the total number of hospital days provided within a given spell of illness, and, in addition, a required review by the hospital utilization review committee for extended-duration cases. At that time, the absolute limitation of 60 days with full coverage and 30 additional days with $10 coinsurance was very long and provided no control on length of stay in the vast majority of hospitalizations. Therefore, the control mechanism relied upon for most cases was recertification for medical necessity by the physician and review by the Utilization Review Committee.

Donabedian (77) appropriately describes (re)certification, as ordinarily carried out, as a method of delegated review and control rather than as a method of assessment. Usually the physician in charge is delegated by the program to decide whether care is suitable, and he then certifies its appropriateness. In effect, the physician is being asked to assess the appropriateness of his own care as well as that of the other services he has ordered for his patient. In so doing, he is expected to use his best professional judgment, with or without external guidelines provided by the program. Thus, he exercises not only self-control, but also control over the wishes and propensities of his client, and, in controlling any tendencies for clients to "abuse" the program, he functions, in part, as the agent of the program.

Delegation of the certification function is almost never complete. The decisions of the individual physician are ususally subject to review by his colleagues in the provision of care and/or by his peers on behalf of the program that finances care.

There are several types of certification, depending on when in the course of care certification is required. Initial certification may take place before, or at the time of, the commencement of care. Subsequent certification may follow, once or repeatedly, at specified intervals. The times for first and subsequent certification may be uniform, being the same for all diseases, conditions or types of care, or they may be variable, being different for each disease, condition or type of care.

Early Medicare regulations offer an excellent example of requirement for initial certification followed by recertification at uniform intervals.

Donabedian (77) stated the requirements to be: The attending physician or a member of the medical staff having knowledge of the case must state in writing at the time of admission or as soon thereafter as possible the medical necessity for the hospital admission. The first recertification must be no later than the 14th (now the 12th) day of hospitalization. A second recertification is required by the 21st day (now the 18th) of hospitalization, with subsequent recertifications as of a lapsed time set by the local utilization review committee, but at intervals of no more than 30 days. At the option of the hospital, the utilization review committee's review of extended duration stays can take the place of the third and subsequent recertification.

The institution of uniform-interval certification appears to be a fairly well established procedure in medical care review. It is therefore surprising to see that no clear rationale for the choice of most appropriate times at which certification is to be sought has been developed. Several studies have shown that long hospital stays are frequently unnecessary. Moreover, although such stays are relatively infrequent, they account for a disproportionate number of unnecessary hospital days.

Rosenfeld, et.al. (277) found, in four Boston hospitals, that 42 percent of patients who, on a given hypothetical day had been in a hospital 30 days or longer, did not require active hospital care. Furthermore, although such long stay cases constituted only six percent of discharges, they accounted for 32 percent of hospital days used during the year. A more recent study by Van Dyke, et. al.(345) showed an essentially similar picture for hospitals in New York City, where nine municipal and voluntary general hospitals were studied. On a given day, 26 percent of patients in municipal hospitals and 21 percent of those in voluntary hospitals were found to have been in hospital for 30 days or longer. Of these patients, 41 percent were judged not to require the services of a general hospital. The proportion of those in hospital unnecessarily was 50 percent for long-stay cases in municipal hospitals. It varied between 15–59 percent for those in voluntary hospitals, with an average of 29 percent.

Donabedian cited these figures to indicate the magnitude of the problem and to explain in part, why so much attention has been directed, in schemes of utilization review, at the justification for extended hospital stay. Since the problem is even more serious among the elderly, the emphasis in the Medicare Program is easy to understand. But there are those who suggest that the emphasis may be partly misplaced. Fitzpatrick (110) has expressed the following opinion: Part of the reason for recertification programs is an unspoken feeling that long lengths of stay tend to involve more overuse than short lengths of stay. This may be very far from the case. . . . The recently published Patterns of Patient Care (265), which is a study of effectiveness of hospital use, indicates that a 14-day cutoff point would miss 95.8 percent of the overstays in appendicitis; 68.9 percent of the overstays in fibromyoma of the uterus; 54.9 percent of the overstays in urinary tract infection; and 37.0 percent of the overstays in diabetes. Actually, there is some reason to believe that long lengths of stay tend to be more clearly appropriate. This is because they are more likely to be complicated cases, which are more likely to be appropriate; and because the patient's resources and coverages tend to run out in the longer time period, and greater economic pressure operates on the less sick patients and their physicians.

He feels the data of Riedel and Fitzpatrick, while insufficient to deflect attention from long-stay cases, serve a useful purpose in highlighting the need for systematic elucidation of the concepts and empirical data that underlie the choice of certification intervals. One needs to determine not only how many cases are found to be inappropriately hospitalized at various intervals after admission, but also how many hospital days would be "saved" if hospitalization were interrupted at the time inappropriate use was detected.

In view of the problems associated with certification and review at uniform intervals, a great deal of interest has recently centered on methods of variable-interval certification. With these methods, the post-admission certification time differs according to diagnostic category. The assumption is that there is an average appropriate length of stay for each diagnosis, and that cases which stay longer ought to be certified as appropriate and perhaps, in addition, reviewed to determine appropriateness. Less attention has been given to review of cases that stay for periods significantly shorter than the average appropriate length of stay.

Decker and Bonner (66) have reported on three major approaches to certification of need for hospital care:

- Precertification
- On-Site Concurrent Hospital Review
- Hospital Discharge Audits

### Precertification

They proposed that precertification is most appropriate for elective hospital admissions, but has been required for the continuing care of emergency admissions and for long stays which exceed originally anticipated norms. Well known precertification programs now exist in Sacramento's Certified Hospital Admission Program (39), Illinois' Hospital Admission and Surveillance Program (143), and New Mexico's Hospital Admission Precertification Program (144).

Precertification may be performed by individual physicians, using varied and implicit criteria, as in the Medicare program; it may be formalized with explicit criteria and delegated to hospital utilization review committees; or it may be conducted on a regional basis by an intermediary, EMCRO, or PSRO. Various combinations of these approaches are also possible.

The objective of precertification is to control the volume of hospital service by specific and limited prospective authorization. This is accomplished in two ways:

(1) By reviewing the necessity for hospital admission against implicit or explicit criteria describing indications for admission for the most common diseases;

(2) By prospective authorization for a length of stay based on empiric, average regional or national experience for that specific disease.

The source document for precertification is always an application completed by the physician proposing to provide the service. The application is usually processed by a trained reviewer, backed by medical consultants; where explicit criteria have been developed, however, precertification could be largely automated.

The value of precertification programs has not yet been fully documented. The admitting diagnosis, which defines the needs for care, may be hypothetical in a patient who presents with an undiagnosed problem. Little is known concerning the effect of delays introduced by precertification and possible legal liabilities for denying admission. Physicians rapidly learn how to avoid denials of precertification. Finally, the cost-to-benefit ratio for precertification in the HASP program has been questioned by a recent audit (261).

The New Jersey Blue Cross experience with a type of precertification in the AID (Approval by Individual Diagnosis) deserves detailed mentioning. This model which illustrates an approach to precertifying and reviewing length of stay at intervals that vary according to diagnosis was instituted by New Jersey Blue Cross and Blue Shield in collaboration with the Medical Society of New Jersey and the New Jersey Hospital Association (146,216). Donabedian (77) described the AID program in three parts:

(1) Institution of standards of length of stay,

(2) Certification and recertification of hospital stay, and

(3) Review of certification decisions.

The first part consists of a determination of the standards of length of stay which are considered to be permissible for each diagnostic category. The manner in which such standards are determined is critical to an understanding of the nature and significance of this method of control.

AID standards are derived primarily from the opinions held by New Jersey physicians of what is maximum permissible length of stay for specified diagnostic categories. The data were obtained by asking the president of the medical staff of each participating hospital to provide, after consultation with his medical staff, an opinion on the "permissible maximum stay, without complication, [so that] the physician would be able to inform each patient as to the expected maximum duration of hospitalization benefits (77). The returns were tabulated and the model length of stay (the one most frequently cited) was almost always used as the standard for AID use. AID standards are therefore primarily normative in derivation. However, the Blue Cross plan had available to it a detailed statistical analysis of actual lengths of stay by diagnosis for all participating New Jersey hospitals for a recent year (1963). These empirical data were compared with the normative data and in a few cases appropriate adjustments of the standards were made in the light of actual experience.

There are 800 three-digit diagnostic codes in the International Statistical Classification. Length of stay standards were determined, as described above, for the 230 most frequent diagnoses. These accounted for 94 percent of the inpatient claims. The remaining diagnoses were all assigned a maximum permissible length of stay of nine days. The 230 frequent diagnoses were listed according to the Internal Classification with an indication of the standard maximum permissible length of stay for each.

The second part of the AID system is the *certification and recertification of hospital stay*. On admission to the hospital, the patient is assigned (usually by the admissions office) the standard length of stay for the diagnosis that is responsible for admission. When there is more than one diagnosis, and it is not clear which is the one primarily responsible for admission, the shortest applicable length of stay is assigned to the case. There is no need for the patient's physician to become involved in certification unless the patient is still in the hospital one or two days prior to the expiration of the original and automatic certification. If the patient is not discharged within this interval, the physician is asked to reconsider the case and, if he feels the patient requires a longer stay, to certify to this effect by filling out an appropriate form giving any change in diagnosis, the approximate number of additional days required, and the reason for the extension. One copy of the form is sent to the Blue Cross plan, another is sent to the utilization review committee of the hospital, and a third remains in the patient's hospital chart. This certification procedure may be repeated once or more at the times indicated by the physician in the prior certification. The length of stay for which the plan pays is only limited by the nature of the insurance benefits under the plan.

The third part of the AID system, and one of critical importance, according to Donabedian, is the review of individual physicians' certification decisions. As already described, copies of recertification forms are sent to the insurance plan and to the hospital utilization review committee. It was expected that the major review and control function would be performed by the utilization review committee and that in this way, the hospital staff would collectively control its own practices. In addition, the Plan was to review the completed certification forms and call attention of the hospital utilization committee to cases that seem to merit further investigation. In this way, AID could strengthen utilization committees by pinpointing administrative areas, diagnoses and physicians where review might be valuable.

Donabedian (77) outlines certain features of the AID system of certification and review that deserve special mention. One is the historical development of the program. Certification was introduced by New Jersey Blue Cross in 1955 with initial approvals for 28 days and additional reapprovals at 21-day intervals. In 1963, the period of initial approval was cut down to 14 days and additional reapprovals were required at 14-day intervals. Approval by Individual Diagnosis was introduced in 1965. That this progression may foreshadow a pattern of more general applicability is suggested by Blue Cross data, which show a trend toward shorter approval and reapproval intervals.

Another interesting aspect of the AID program is the convergence of forces that brought about its institution. These included public concern over increasing hospital cost and direct pressure from the insurance commissioner that something be done; shortage of hospital beds in the face of a trend toward longer hospital stays; fruitful collaborative relationships among the Blue plans, the medical society, and the hospital association; and strong endorsement by organized labor.

A third feature of some significance is the manner selected to bring pressure to bear upon the physician to comply with the certification procedure. Theoretically, the physician is free not to participate. However, should he refuse to recertify additional days of stay at the expiration of the initial standard period, the patient is informed of this and billed directly for the additional days. Hence, the certification procedure is an attempt to introduce a reciprocal set of controls into the patient-physician relationship. The physician can use the certification requirements to restrain the patient's desire for hospitalization beyond the point of medical necessity, while the patient, pursuing his economic interests, can exert pressure on the physician to cooperate with an essentially administrative process of control. Donabedian and Attwood (74) have pointed out that the control of patients through their physicians, and of physicians through their patients, exemplify frequent approaches in administrative control where the financing agency has no means of exercising more direct controls over the parties concerned. Whether such controls are effective remains to be demonstrated.

A fourth feature is the provision for review while the patient is still in the hospital, enabling the utilization committee, through proper channels, to assist the physician and administrator in achieving more appropriate length of stay. The significance of such concurrent review, as contrasted with the more usual retrospective review, will be discussed in the following sections. It has been suggested that the impact of precertification would be enhanced by continuing On-Site Concurrent Hospital Review.

Decker and Bonner (66) proposed that precertification programs can be used to evaluate both the necessity for hospital care and an appropriate length of stay. They are most effective when re-enforced by simultaneous On-Site Concurrent Hospital Review. They recommend:

(1) That the programs emphasize common admission diagnoses;

(2) That they use explicit criteria and automated processing, insofar as possible.

### On-Site Concurrent Hospital Review

Decker and Bonner (66) feel that on-site concurrent review is primarily appropriate to hospital settings for two reasons.

(1) The logistics of providing a trained reviewer require a critical mass of providers in one site for cost justification.

(2) The impact of this approach is dependent upon the support of an organized, functioning, and effective medical staff.

On-Site concurrent hospital review limited to length of stay is now being conducted in Georgia's Certified Hospital Extension of Care Program (40) and Sacramento's Certified Hospital Admission Program (39). On-site concurrent review for both utilization and the quality of care is now being performed in Utah's On-Site Concurrent Hospital Utilization Review (235) and in Multnomah County, Oregon, with its Concurrent On-Site Evaluation and Review Effort (52).

The objectives of these current programs include:

(1) Assignment of a diagnosis specific length of stay with appropriate modifications resulting from continued on-site review of the patient's changing condition;

(2) Concurrent review of the necessity for hospitalization, appropriateness of the diagnosis, relevance of the investigation and treatment, and the quality of the medical record by a trained nurse reviewer supported by the hospital's own staff mechanisms and committees;

(3) Use of the nurse reviewer or the records librarian to abstract medical records, as they are completed, for retrospective comparison with normative process criteria for the quality of care.

They feel that on-site concurrent hospital review is exquisitely dependent upon the skill and tact of the nurse reviewer and upon the strength of the hospital medical staff organization whose participation makes this a peer review program. It offers an opportunity to influence the quality of medical care while it is being delivered. Because of the need for human intervention, this approach is considerably more expensive than automated reviews.

On-site concurrent hospital review could be conducted in large institutions, by a nurse coordinator employed by the hospital who reports to the hospital utilization review committee. This approach has been implemented, in part, by New Mexico (144) for HAPP participating hospitals. The feasibility of the program in small institutions will depend upon the use of a single nurse coordinator by multiple hospitals or on the use of a nurse coordinator for multiple functions in a single small hospital. The use of a hospital employee to reduce hospital utilization may generate a conflict of interest; resolution may depend upon a reorientation of current hospital objectives.

On-site concurrent hospital review, itself, cannot be automated. Many opportunities exist, however, for mutual support between this program and automated programs for precertification and retrospective hospital discharge auditing.

Decker and Bonner (66) concluded that on-site concurrent hospital review can be conducted in hospitals by nurse coordinators (or other trained personnel) employed by the hospital, or a group of small hospitals, reporting to the hospital utilization review committee, with the added support of medical advisors on the hospital staff. These efforts should emphasize:

(1) Modification of authorized length of stay, in relation to the patient's changing condition;

(2) Concurrent review of quality to influence care while it is being delivered.

### Retrospective Hospital Discharge Audits/Volumetric Appraisal

Retrospective medical audits, in hospitals, have been conducted since 1914 by appropriate committees using case review techniques and implicit criteria. Since the advent of Medicare (Title XVIII) utilization review has been added to quality review as a major focus for these activities.

By law (Medicare) there are two aspects of utilization review required:

(1) Review of stays of extended duration, and

(2) Studies of patterns of care.

Of these two, the review of long stays have received the most attention and are fully operative in most institutions.

A major deficiency in the utilization review process is the failure of most facilities to implement sample reviews, perform special studies, and to review admissions, short stays, and professional services that have been rendered. In many cases, facilities do not recognize the educational value associated with these types of studies.

As a result of their reviews, few utilization review committees have made recommendations relating to institutional policies and practices as distinguished from findings in individual cases. Many institutions believe that by simply subscribing to a data service which compiles statistics, designs profiles and produces some comparable data, the requirements for medical care evaluation are met. This is not so.

Recently, state agencies and fiscal intermediaries have begun an effort to try to improve the general quality of utilization review and have placed heavy emphasis on sample reviews and special studies. It is their feeling that these studies are the most significant aspect of utilization review and have the potential to affect improvements in patient care practices.

In the early years of utilization review, a large amount of time was spent educating physicians and other health professionals regarding the nature and philosophy of utilization review. The most difficult area in the development of the utilization review process was in extended care facilities. These facilities were smaller than hospitals and unaccustomed to internal audit committees. They also lacked organized medical staffs. Because of these problems, the Social Security Administration funded several demonstration projects whereby county medical societies performed the review functions for selected extended care facilities. This concept worked and grew and now areawide utilization review, under the auspices of a county medical society, prevails in many parts of the country.

One of the estimates used to evaluate utilization of hospital facilities is the average length of stay. Length of stay is commonly measured retrospectively by hospital discharge audit systems. This evaluation depends upon (66):

(1) The development of age specific empiric norms for length of stay by diagnosis, (with or without surgery, and with or without multiple diagnoses) from a large body of national or regional reporting institutions;

(2) The comparison of each hospital, service, or physician with a comparable universe selected in accordance with specified characteristics; and

(3) The reporting of comparative statistics, or exceptions which deviate from these norms, for more intensive hospital review.

The necessity for admission, including the validity of the discharge diagnosis, may be also studied retrospectively by hospital discharge abstract systems. Available criteria for this evaluation usually refer to the content of the admission note, or the recorded history and physical examination. Special training is required for records librarians to be able to abstract this information from the medical record. Since the extra effort, and cost, may not be worth the additional gain, and since this facet of evaluation is perhaps better performed by prospective and concurrent methods (previously discussed) Decker and Bonner do not recommend this objective for retrospective audit and abstracting.

Myers and Slee (225) document the fact that average length of stay can be a crude and misleading statistic. The formula for average length of stay runs together a mass of patients with entirely dissimilar disease conditions that yield an unrealistic average. They feel there is a need to bring attention to length of stay in a different light. They cite that PAS indicates that length of stay should not be limited to a single concept, but should vary with patient needs and demands. Along with PAS, they suggest the following as being significant to the length of stay statistics of hospitals and extended care facilities:

- *Average Length of Stay by Service* – An accurate presentation of average length of stay by service can assist the staff and administration in their appraisal of where more beds are needed and whether the stay of patients on certain services can be safely reduced. This is particularly true in hospitals which are faced with bed shortages or in institutions planning for expansion of facilities.

- *Average Length of Stay by Disease Groups* – This type of information seems vital in order that a hospital may know the frequency of certain types of diseases and may plan facilities and services accordingly. It is often necessary to know the average length of stay according to broad diagnostic groups. Also, many times patients are admitted to different services than they ultimately end up on, depending upon the disease involved.

- *Average Length of Stay by Age* – It is recognized that older patients generally require longer periods of hospitalization. Although there are differences in stay from hospital to hospital within individual age groups, each hospital shows a progressing increase in length of stay for advancing age. Length of stay should be figured separately for pediatric and adult patients as evidence shows that the patients under 14 years of age lower the average length of stay for hospitals.

- *Average Length of Stay by Sex* – Studies done show that the average length of stay for males exceed the length of stay for females, although the difference is slight. The relatively short stay for maternity cases pulls down the average for all females.

- *Average Length of Stay by Specific Disease or Operation* – The most information given by the average length of stay is obtained by computing this statistic for patients with the same diagnosis or for patients upon whom the same operation was performed. This allows people to make comparisons of stay for the same conditions from one time period to another. If an increase or decrease in the average length of stay is shown for certain diagnosis, reasons for such should be sought. Also, in computing these averages deaths should be excluded. This is important with such diagnosis as acute coronaries where a large proportion of patients die on the first hospital day. In these cases, adding in deaths for only one day would reduce the length of hospitalization average and obscure the figures for that particular diagnosis.

- *Average Length of Stay by Physician* – Of growing interest to many medical staffs is the variation in average length of stay for the same disease according to the physician who treats the patient. This is particularly true if a bed shortage exists and if the patients of some physicians stay longer than the patients of the remainder of the medical staff. A comparison such as this can help reduce the necessary stay and make for more equitable distribution of beds among the staff.

- *Average Length of Stay by Payment* – This category has growing interest to medical and administrative staffs of hospitals – the average length of stay in relation to the payor of the hospital bill – due to steadily increasing costs of hospitalization. In the best interest of all concerned, the total days of hospital stay should be kept to the absolute minimum consistent with the patient's well being. It is interesting to note that patients under both commercial insurance and Blue Cross have shorter overall lengths of stay than those without insurance or those under some other plan such as Workmen's Compensation. To date, a reason for this has not been documented.

Another parameter of length of stay has to do with the direct factors influencing patient's length of stay. Altman (1) conducted a study of 212 pairs of patients, with identical diagnoses, at two acute hospitals in an eastern city. During the course of the study, each pair of patients' physicians was interviewed with the medical record at hand. The results showed that the following five factors, other than clinical, affected the length of stay, both longer and shorter.

*(1) Social and Economic Reasons.* Eleven percent of the total study population fall into this group. The predominant reasons for longer length of stay were:

- Unsuitability of the patient's home to receive him;
- No one available to take care of him;
- Delay by the family in consenting to consultation while hospitalized;
- Patients desiring to stay in the hospital to use their insurance benefits.

Reasons for shorter lengths of stay included:

- Patients who were concerned about limited or non-existing insurance benefits;
- Patients who wished to return to work as fast as possible;
- Patients leaving the city upon discharge.

*(2) Psychological and Emotional Reasons.* Sixteen percent of the study group fell into this category. Of the 16 percent, there was even distribution – 8 percent and 8 percent – of those with shorter or longer days. Reasons for longer stays included:

- Fear or fright;
- Those who needed special attention and could not be trusted at home;
- Those who insisted on staying because they wanted continued hospital care.

In the shorter stay group, reasons included:

- Patients desiring discharge because of previously arranged plans;
- Patients who refused treatment;
- Patients who were complainers about the hospital environment;
- Patients who were alarmed about being in the hospital at all.

*(3) Hospital Reasons.* Six percent of the study group fell into this category. There were no shorter stays in the group. The following reasons were attributed to longer stays.

- Waiting for lab or x-ray results;
- Admission several days prior to surgery;
- Weekend admission with limited services;
- Unavailability of operating room at scheduled time.

The patients in this category were younger compared to the other categories and the overall lengths of stay were generally shorter.

*(4) Physician Reasons.* Six percent of the study group fell into this category. There were no instances in which the physician admitted being responsible for increased length of stay. The closest to such a statement was related to overscheduling of surgical procedures by individual physicians. For the most part, it was felt that delay was due to other than the attending physician, such as waiting for a consult or poor judgment on the part of the house staff.

*(5) Other Reasons.* Four percent of the study group fell into this category. This consisted mainly of longer stays because of distance or transportation problems. Where transportation was not a factor, finding a bed in another hospital or extended care facility was the reason for the delay. In almost every instance the patients falling into this category were elderly.

The remaining 57 percent of the study group had medical reasons for longer or shorter lengths of stay. It was the author's (1) opinion that for the most part reasons other than physical illness should not be termed as "overutilization." To cite Ray Brown (1) "Undoubtedly, there are some needless uses of hospital days. The question of how sick is sick enough to require hospital care may increasingly lose its relevance as the public becomes increasingly sophisticated of hospital usage. The pertinent question may become one of the level of sickness that makes it more convenient to go to the hospital than to stay at home. The hospital is regarded as a life-saving institution by the public, but it also represents a major convenience. The chances are that it would be increasingly recognized and utilized as such by a people whose culture has emphasized the notion of convenience."

Further factors effecting length of stay are discussed by Rosenfeld, et.al. (277). It is their opinion that the general hospitals in this country will be utilized to their best advantage if both admission and length of stay are based on the patient's need for services which cannot be rendered in any other type of institution, in an outpatient clinic, or physician's office. A study was conducted of patients in four general hospitals staying 30 days or longer. The study was to determine the reasons for prolonged hospitalization and try to define factors affecting hospital utilization. There were 369 patients in this study. Each of the long-stay patients was evaluated as to specific requirements for service on the basis of specially developed criteria. These criteria included a list of facilities performing different functions and a list of patients' characteristics indicating need for service in one of the various types of facilities. The discharge study revealed that:

- Six percent of the total patients studied remained in the hospital 30 days or longer, and this group accounted for almost one-third of the total patient days rendered.
- Fifty-six percent of the long-stay patients required continuing active treatment in the hospital.
- Forty-two percent did not require hospital care, but many of them needed other types of care.

The primary reasons for keeping these long-stay patients in the hospital despite the fact that they did not need continued active treatment were:

- Unsuitability of the patient's home;
- Reluctance of the family to upset the patient;
- Lack of extended care facilities or services such as meals on wheels, etc., that the patient could not have access to if he were at home.

The long-stay groups in the study contained a large proportion of elderly people with diagnoses of tumors and injuries.

The study pointed out the fact that admission to the hospital and length of stay are attributable to a combination of social factors as well as medical ones. Very often the medical needs are overshadowed by the need of physical or psychological shelter and support. Many times persons who no longer require general hospital care must be kept at the hospital at total expense because of difficulty in finding a suitable place or services for the patient. The economic implication of inappropriate placement of patients in general hospitals or longer than medically indicated stays are grave. Unnecessary hospitalization is costly in terms of dollars spent and also in terms of dimension of resources and services for those who urgently need the specialized services of a general hospital. It adds to the shortage of beds and may well raise serious staffing problems. One thing that is many times forgotten when speaking of this subject is the impact of a long-hospital stay on the patient. This can have harmful effects on him, his relationship with his family, the community, and his ability to readjust to life upon his return from the hospital.

The recent study conducted by Kolb and Sidel (174) in a large eastern teaching hospital established the hypothesis that utilization review mechanisms are effective in changing length of stay patterns. Their analysis suggests that arbitrary limitation is much more effective than utilization review but that utilization review may be more selective in reducing length of stay. In the lmitation method the hardship is a financial one, placed on all patients staying beyond the arbitrary period. In the review method, it is a matter of responsibility and reputation for appropriate use of facilities, placed on the physician. Since the medical necessity for continued stay up to a given point is usually very clear, the effectiveness of the review mechanism resides in its ability to deal with some of the economic and social determinants of length of stay which begin to play a role after the clear-cut, acute medical problem has begun to subside.

Current literature on length of stay addresses itself quite extensively to the subject of overuse and underuse of hospital facilities and the effect that utilization review committees are having with respect to these issues.

Fitzpatrick (106) feels that the appropriateness of hospital utilization is questioned mainly in terms of medically unnecessary use of the hospital. This unnecessary use falls into the following classifications:

- Unnecessary admissions
- Unnecessary long lengths of stay
- Unnecessary treatment
- Unnecessary diagnostic procedures

Overuse is emphasized here because of the concern over rising costs but underuse may be a problem as well. Underuse in terms of hospital admissions cannot be discovered unless the general population is considered rather than the hospitalization population. Hospital stays for too short a length of time and the omission of certain medical procedures may occur for a variety of reasons. They do not constitute only a financial problem, rather a problem of quality of care. Neither overuse nor underuse can be discovered or even defined without some concept of appropriateness of hospital use. Appropriateness must be seen in a medical context in order to identify and solve problems related to overuse or underuse. One of the purposes of the hospital utilization committee is to provide knowledgeable professional review of these factors in hospital use.

Several studies have been conducted recently to try to determine what effects hospital utilization review committees are having. A recent report of utilization review committees in the Pittsburgh, Pennsylvania area reveals that in their experience with utilization committees in hospitals and extended care facilities, they have achieved the following:

(1) Increased the awareness of physicians of their role in determining utilization rates.

(2) Resulted in specific administrative changes designed to improve utilization practices at a number of hospitals.

(3) Improved liaison between medical staffs and hospital administration with respect to medical administrative problems.

The Pittsburgh surveys show that one way to obtain an early measure of the impact of utilization review committees is by asking those connected with the activities to render judgment. Evaluation of utilization review committees is a difficult task. If it is assumed that having a hospital utilization committee is better than not having one at all, one could simply count the increasing numbers of hospitals that have committees and assure ourselves that progress is being made. If it is assumed that having an active committee is better than having a committee that is not so active, the hospital can be surveyed to find out how many members are on the committee, how often they meet, if they keep minutes, whether or not they interview attending physicians, how many and what kind of medical records they review, what recommendations they have made, etc. When a great deal of activity is recorded, it can then be assumed that some results are being achieved; but we still do not know what these results are. Still, it is important to try to evaluate the work of the hospital utilization review committee. If one wants the committee to be adequately motivated to continue their work, one must be able to show them some accomplishment as concretely as possible. If they have no accomplishments, something may be wrong with their methods in which comparative achievements of other hospitals is in order.

Fitzpatrick (110) contends that there is much to be learned about all facets of utilization review that can only be learned through sound research. He proposes the following 14 points as being vital issues to areas where research would improve the efficiency and effectiveness of review mechanisms.

"(1) The existence and meaning of criteria in medical practice.

(2) Analysis of the components of the physician's decision-making process regarding admissions and discharges.

(3) Methods of arriving at consensus on criteria by a group of physicians.

(4) Variations in criteria in localities and regions and the meaning of these variations.

(5) The opinions of patients, physicians, nurses and administrators regarding influence of non-medical factors on hospital use.

(6) Comparison of inpatient medical services by visiting teams to review findings on the medical records of these same patients following discharge.

(7) Effectiveness and efficiency of various review methods such as individual versus group judgment, pre-established criteria versus no formalized criteria, use of the medical record versus use of an abstract.

(8) Automated methods of screening cases for review.

(9) Automated methods of evaluating cases, in a preliminary way, which may reduce the labor involved for the doctors still further.

(10) Simplified criteria for evaluating cases – what are they and do they work? Can average length of stay or average length of stay without complications be used?

(11) Improvement of the medical record for purposes of utilization review.

(12) Effectiveness of various kinds of utilization review and/or control plans.

(13) Methods of measuring and influencing utilization in extended care facilities and tuberculosis hospitals, rehabilitation units or hospitals, and in the physician's office.

(14) Effectiveness with which the whole health system is used by, or on behalf of, the patient with relation to an episode of illness longitudinally studied (110)."

Slee (315) suggests that the term *utilization evaluation* be used for retrospective review of admissions, duration of stay, and professional services furnished with regard to their medical necessity and efficient use of facilities and services. It is that segment of the utilization review plan, as it applies to the hospital, that is related to the internal medical audit.

Appropriate use of hospital and medical resources and facilities has always been of concern to conscientious and thoughtful physicians and hospital administrators. The medical audit has always pointed out excessive use of drugs, unnecessary hospital stays, and other wasteful practices. The medical audit did not have its origin, however, in attention to the conservation of resources but rather it sprang from one of the most basic drives in medicine, the drive to provide the best care. Leadership in developing a methodical approach to monitoring the quality of care and maintaining the highest standards came not only from the American College of Surgeons and the American College of Physicians but also from hospitals and particularly from their medical staffs. Hospitals in 1949 spurred the establishment of the Professional Activity Study and then went on with the American College of Surgeons to develop the Medical Audit Program.

The medical audit movement had barely achieved a good foothold when third parties began to demand tighter control over the use of hospital resources. Hospitals were asked and even ordered to establish utilization committees, not primarily to improve the quality of care, but to reduce the amount of care.

A number of utilization committees with this origin are in operation. The California Medical Association considers a hospital utilization committee essential, and the Tenth Councilor District of the Pennsylvania Medical Society has been nationally acclaimed for its pioneering in this area, to cite only two of the developments.

Slee (315) quotes J. Everett McClenahan, M.D. of Pittsburgh in describing the scope of utilization evaluation concerning the following questions:

"(1) Was the patient's admission to the hospital necessary?

(2) Has the treatment of the patient, while under medical care, been carried out as expeditiously as possible with a minimum of delay in the prescribed treatment?

(3) Was the patient discharged as soon as he was medically ready?"

Each of the questions obviously reflects the fact that there are criteria or standards for propriety of admission to a hospital, speed of delivery of diagnostic procedures and treatment, and medical readiness for discharge. Utilization review or evaluation requires comparison of the care given individuals or groups of patients against these criteria. Since it is retrospective, this evaluation depends on the normal documentation found in the clinical records of discharged patients.

The similarity of this process to the medical audit is apparent. Both depend upon comparing medical care as reflected in medical records against standards representing the desired care.

But there are significant differences between what utilization evaluation usually means to utilization committees and what medical auditing means to American medicine and hospitals. Furthermore, important lessons about effective methodology learned in the medical audit have not been applied in the utilization committee approach.

A medical audit is defined as the evaluation of the quality of medical care as reflected in medical records. In order to see the difference between utilization evaluation and a medical audit, the definition of a medical audit must be dissected. The simple word "quality" holds the key. There is a difference in scope between utilization evaluation and the medical audit.

In a medical audit, quality is defined as the degree of conformity with standards, with accepted principles and practices. These desired standards of excellence demand that certain fundamental things be done for every patient, that another absolute minimum battery of steps and procedures be taken for specific types of patients, and finally that in all instances investigation, diagnosis and therapy are tailored to the individual patient.

The goal is to achieve those standards which each physician would like to have met when he or a member of his family is the patient, and which he sincerely tries to maintain in his own practice.

Shain (297) conducted a pilot study to determine what types of cases require special efforts to control utilization. The approach taken is defined by the following three steps:

(1) Defining the condition under study. In this case, it became quickly apparent that the "disease" which became known as over-utilization was really two conditions which, although related, had to be analyzed separately. Over-utilization may occur either when (a) a patient who does not require inpatient diagnostic or treatment services is admitted

to the hospital, or (b) when a patient is kept in the hospital longer than necessary. Other factors might also be considered, such as excessive use of drugs or laboratory tests, during the hospital stay. The approach in this study was limited, however, to the two most basic components of hospital utilization, which are admission and length of stay.

(2) Determining the special characteristics of the groups in the population who were afflicted with the condition.

(3) Devising control measures that were tailored to the specific nature of the condition and to the special characteristics of the groups that were affected. This was particularly important when the means of control are scarce or expensive.

Shain (297) reported the following findings:

*Questionable Admissions.* Forty-two cases (about four percent of the total number studied) were classified under this heading, on the basis of being scored four or five on both the diagnostic and treatment services which were provided. This meant that both the diagnostic and treatment services were characterized as procedures that could easily have been done outside of the hospital, or that no significant procedures were performed. Seven classes of patients had significantly high proportions of cases scored as questionable admissions.

By age and sex, two groups had significantly high proportions of questionable admissions, men between 15 and 24 and women over 65. By reason for hospitalization, the patients admitted apparently for "observation and or diagnosis" and for "medical service" had significantly high rates. Two diagnostic groups, arthritis and rheumatism, and accidents, were outstandingly high. Finally, when the attending physicians were classified as full-time specialists, and general practitioners (according to their listings in the national and state directories), the patients of the part-time specialists were significantly high on their rate of questionable admission.

A number of classifications of patients yielded negative results, that is, no class was found with a significantly high rate of questionable admission. The distance of the patient's residence from the hospital, the patient's birthplace, marital status, religion, type of accommodation in the hospital, and source of payment of the hospital bill were the classifications which showed no significantly high groups.

*Excessive Length of Stay.* The reviewing physicians judged that 50 patients (five percent of the total) were in hospital for periods which were probably or definitely excessive.

The only age and sex group with a significantly high rate of excessive stay were the women between 45 and 64 years of age. By reason for hospitalization, the patients admitted for "medical service" and for "observation and/or diagnosis" were again the two groups with high rates. By source of payment of the hospital bill, public assistance clients were scored as having excessive stay in significantly high proportions. Three diagnostic groups, patients with skin infections, arthritis and rheumatism, and non-traumatic orthopedic conditions were scored high.

No significantly high excessive stay groups were found when the patients were classified by residence, place of birth, marital status, religion, type of accommodation, or type of attending physician.

### Data Display and Analysis

Decker and Bonner (66) reported that during the past decade, sophisticated computer techniques, operated by national or regional programs, have helped to display and sort the material for review. Central reporting by many institutions has added an additional dimension to the review; namely, the opportunity for inter-hospital comparison.

Available hospital discharge data collection systems depend upon the information in a source document prepared by the medical records librarian at the time of discharge or when the record is completed. The amount of data required by each system is variable, but a minimum set of basic data has recently been established (135,145). Computer processing permits the development of summary displays, statistical summaries, and managerial indices. These data permit evaluatory comparisons with other time periods, other institutions or professionals, and with accepted process criteria.

Donabedian (77) reported that the application of data processing techniques for administrative appraisal, and control of utilization and quality was probably pioneered (with initial support by the Kellogg Foundation) by the Commission on Professional and Hospital Activities (CPHA) in Ann Arbor, Michigan. CPHA is a non-profit agency, established in 1955, and sponsored by the American College of Physicians, the American College of Surgeons, the American Hospital Association, and the Southwestern Michigan Hospital Council. Its subscriber hospitals, of which there are over 1200, are offered a variety of services, including the Professional Activity Study (PAS), the Medical Audit Program (MAP), and the Length of Stay (LOS) Package. A more recent example, partly patterned on PAS, is the Hospital Utilization Review Project (HUP), cosponsored by the Allegheny County Medical Society Foundation and the Hospital Council of Western Pennsylvania, and supported by the Blue Cross of Western Pennsylvania. He uses these two agencies (CPHA and HUP) as the model for the description of statistical display and analysis. His intent is to convey a sense of the general applicability of this approach rather than to endorse specific models.

The critical components of a system of statistical display and analysis are:

(1) Information suitable for mechanical or electronic processing,

(2) Data display and summarization,

(3) Evaluation

The basis for a fully-fledged system of statistical display and analysis is, generally, an abstract of each patient's hospital record prepared in such a way as to permit easy coding and transcription for machine or computer processing. The nature and amount of information abstracted from the record and available for processing, may vary widely. The PAS abstract, for example, has extensive information on patient management, including details of diagnostic workup and therapy. There are about 150 possible items of information in all. By contrast, HUP uses a much simpler abstract with attention focused mainly on length of stay parameters by type of operation and diagnosis. These parameters include, in addition to total length of stay, the number of days before and after operation or delivery. Thus, the components of the total length of stay are subject to examination.

The statistical system is not necessarily restricted to information in the patient's record. It is possible to set up a system that mechanically combines information from a number of sources so that more elaborate analyses can be made. Such additional data, stored in the computer until called upon, can include more detailed information concerning subscribers as well as physician and hospital characteristics.

The information in both PAS and HUP abstracts tend to concentrate on documenting length of stay and elements of management (professional activities) for type of patient – categorized by diagnosis and by nature of surgical intervention, if any. There are, however, a number of items of intermediate and ultimate end results. These include death or survival, the occurrence of hospital infection or other complications, the removal of diseased or normal tissue at operation, transfer to another hospital or extended care facility, and discharge with approval or against advice. These systems, therefore, lend themselves to monitoring "outcomes" such as these.

The centralization of data processing, display and analysis results in efficient operations. The central agency can develop expertise, assume leadership in developing new techniques, and engage in promotional and educational activities. Upon request, the agency can help the individual hospital evaluate the findings pertaining to it. The agency can also, within limits set by its own policies, evaluate general patterns of care and disseminate information concerning methods and findings. Finally, the accumulation of a large amount of information in one location makes it possible to summarize patterns of care for a large number of cases so that empirical standards might be constructed and comparisons made among individual or categories of institutions or physicians.

Data display and summarization (77) is the second major component in the system of statistical appraisal. The advantages of centralizing this activity for a large number of hospitals have already been pointed out by Donabedian (77). The first mode of display is to supply listings of cases and of their attributes so that each row provides a coded description of the characteristics and management of each case. To facilitate review, the cases may be arranged in a variety of ways. They may be listed by diagnostic category, by type of operation, by hospital service, by physician, or by combinations of these. Within each category, cases may be ordered by length of stay to permit easier identification of aberrant cases. Aberrant cases may be identified and listed separately. Thus, there may be a separate listing for deaths, for cases with operative complications, or for cases in which certain examinations were not performed. Cases falling below or above certain percentiles of a frequency distribution (of length of stay, for example) can be similarly identified and listed.

In addition to listings, there can be tabulations that summarize experience for a hospital, a hospital department, a physician or surgeon, a diagnostic category, an operative procedure, an age group, and so on. The dependent variable (case characteristic) can be presented in several forms: numbers, frequency distributions, means, percentages, percentiles, and so forth. As might be expected a large variety of cross tabulations are possible. In some cases, certain indexes may be constructed. For example, PAS has constructed a "variety index" that indicates the number of tests done in the management of a case or group of cases, and an "impact index" which weights the number of tests done by a score representing the amount of labor required for each test.

Evaluation (40) is the third major component of a statistical system of appraisal. It is usual to say that a statistical system merely presents data in a form suitable for rapid perusal and evaluation by the expert administrator and physician. For example, the Commission on Professional and Hospital Activities is very careful to point out that its role is merely "to increase the accessibility of information contained in medical records so that it can be used to greater advantage in the improvement of patient care" (77). Donabedian feels this is true, but only in part. In selecting items of information for inclusion in the system, in presenting and analyzing data, and in providing bench marks and comparative data, the statistical system helps direct evaluation into certain channels, thereby influencing it. But the final decision as to whether what shows up in that statistical material is "good" or "bad," acceptable or unacceptable, remains with the hospital and its staff.

The appropriate hospital authorities interpret the patterns of care in their hospital by using commonly accepted notions of what is suitable care. Questions may be raised about the diagnosis of myocardial infraction without the performance of certain diagnostic tests, about reports of positive laboratory tests without evidence of follow-up, or concerning excessively long stays without apparent reason deducible from the data in the abstract. All these judgments involve the application of accepted notions of what is good practice (normative standards).

Statistical data also lend themselves to comparisons among physicians and institutions, and the identification of deviance from the average for a group of physicians or institutions. This is the unique contribution of evaluation by statistical display and analysis. Further refinements can be made by comparing like with like. PAS uses various characteristics to group hospitals in a manner most suited to the question at hand. Hospitals are frequently grouped by number of discharges into four categories: small, medium small, medium large, and large. Other classificatory criteria include teaching status, facilities available and geographic location.

HUP prepares hospital "profiles" which show graphically the rank of each hospital, within an array of all hospitals in the community, in average length of stay for a number of selected medical and surgical conditions, further indicating whether the hospital has risen or fallen in rank since the previous time period. The CPHA "Length of Stay Package" shows the average length of stay by diagnostic category in a given hospital, the average length of stay for matching patients in a standard population of discharges, the difference between each pair of lengths of stay, and whether the difference is significant. This CPHA tabulation is based on a method that permits standardization of length of stay by diagnosis, age, whether an operation has been performed and whether there is a scondary diagnosis. Such comparative studies constitute the application of empirical standards, and represent the major contribution of a method of statistical display and analysis to evaluation. Donabedian (77) feels that certain aspects of evaluation through statistical display and analysis deserve special mention. First, it is important to examine frequency distributions, as well as averages, when evaluating the data.

A second point is to emphasize that deviation from the statistical average does not automatically mean something is wrong. The average should not be equated with the good. Deviations merely draw attention to phenomena that may require more careful examination.

A third issue is the nature of primary emphasis in the system: whether on quality or on utilization. He has indicated that the primary emphasis in HUP is on justification of admission and length of stay. By contrast, PAS-MAP includes consideration of many more aspects of management. Thus, the difference may be seen as one of degree rather than kind. Concern with length of stay may be considered to represent interest in one of the many dimensions of quality. As more information is collected and evaluated, the appraisal of quality becomes multidimensional and therefore more meaningful and definitive.

A fourth issue is whether the purpose of evaluation is to identify individual error or wrongdoing, or to discover institutional patterns that require changes in administrative procedure or organization. Which approach is emphasized depends on part on what one believes explains medical behavior in organizations. He reports that Shindell (77) has stressed that length of stay in a hospital is determined partly by accepted modes of practice shared by the majority of the medical staff, and partly by administrative and organizational features of pervasive influence over which the individual physician has limited control. Excessive average lengths of stay are rarely said to be the doing of a few "offenders". Hence, the emphasis in analysis and action is on institutional performance rather than the performance of the individual physician. On the other hand, analysis of PAS data has clearly disclosed aberrant physician, as well as institutional, behavior indicating the need to observe the practice of individual physicians in addition to that of institutions. Thus, the two approaches, far from being mutually exclusive, are reciprocally reinforcing. It is apparent that individual performance should be observed and studied. The group behavior of physicians, and the administrative and organizational factors that influence this behavior, are also of importance. Choice of emphasis in any given situation is often a matter of policy and strategy.

Finally, it should be clear that statistical display and analysis is often only a step in an evaluative sequence, and does not represent the entire sequence. Often, the next step consists of a more intensive study of case records, as the statistical system may reveal pervasive patterns that require investigation and correction. An unusually long average preoperative stay may bring about the examination of a representative sample of cases in order to determine the reason which may be insufficient preadmission work-up, delays in ordering tests or receiving their results, or problems of scheduling in the operating room. Shindell (77) has emphasized that the study of cases will often lead to further administrative and organizational studies designed to elucidate the problem and bring about appropriate action. The HUP (77) program is in fact, seen to include the more extensive sequence indicated in the following steps:

(1) Abstracting the medical record in a form suitable for automatic data processing,

(2) Using data processing to compile statistics on hospital use,

(3) Summarizing comparative experience for specific categories of patients,

(4) Constructing a profile for a hospital by reflecting comparative experience in a number of diagnostic categories,

(5) Instituting case reviews in the specific areas of abnormal experience to identify practices and procedures deserving further investigation, and

(6) Performing special studies of administrative and professional practices and procedures where indicated.

A similar sequence of activities can be said to characterize the PAS system, with the exception of step 6. PAS does not offer to go into hospitals to perform special administrative studies such as HUP made of operating room scheduling.

In addition to revealing undesired patterns of care, the statistical system will also precisely identify the aberrant cases so that attention can be focused on these. One use, therefore, of the statistical system is as a screen to identify those cases that require more detailed review by the audit committee, utilization review committee or other appropriate authority within the hospital.

### Sampling

In utilization and quality review, the following types of cases have been considered to yield a higher proportion of improper use of hospital services (77).

*(1) Long Stay Cases.* The agencies involved in the Hospital Utilization Project (HUP) recommend that long stay be defined not as a single arbitrary period, but differently for each diagnosis.

*(2) Short Stay Cases.* Over ten percent of all cases admitted to general hospitals are discharged after one or two days. Included among these cases may be a significant number admitted for diagnosis or minor surgery which might have been provided as effectively without admission. Each short-term case where the need for admission is questionable should be reviewed.

The Length of Stay Package of CPHA lists individually as short-stay cases all those that are discharged before the day on which the fifth percentile of that class of patients fall. Such cases are more likely to reflect questionable practice than do the long-stay cases as defined by CPHA. Such short-stay cases do not tend to be diagnostic admissions but rather patients who it would seem should have had a longer hospitalization — or none at all.

*(3) Emergency Admissions.* A sample of "emergency" admissions may be reviewed in order to verify the alleged need for priority to hospital admission. During periods of bed shortage and waiting lists, cases may be reviewed soon after admission as a method of concurrent control to assure the best allocation of a scarce resource.

*(4) Symptom Diagnoses.* The presumption is that such cases have not been well studied prior to admission to hospital.

*(5) Certain Diagnostic Categories, Operations and Other Diagnostic or Therapeutic Procedures.* These are selected on the assumption that improper use or improper management are frequent. Over a number of years, the Commission on Professional and Hospital Activities has directed special attention, sometimes involving repeated studies and reports, to the following:

- Diseases — acute coronary occlusion, stroke, toxemia of pregnancy, adult pneumonia, staphylococcal infection in pediatrics, diabetes, bleeding duodenal ulcer, acute infant diarrhea.

- Operations — tonsillectomy, primary appendectomy, radical mastectomy, hysterectomy, tubal ligation, uterine suspension, lysis of abdominal adhesions.

- Procedures — blood transfusions, use of antibiotics, use of anticoagulants.

*(6) Unfavorable Outcomes in Which There Might be Preventability Factors.* These include case fatality, perinatal mortality, postoperative mortality, other postoperative complications, lacerations at delivery, transfusion reactions and other adverse reactions to therapy.

*(7) Potentially Preventable Conditions.* It was pointed out that the hospital care of potentially preventable conditions provides a clue to the adequacy of care prior to hospitalization. Rheumatic heart disease in a young person would be an example. Certain complications of pregnancy and in the newborn would also qualify. Where the nature of the program permits it, the retrospective extension of case review into the prehospital period would be highly indicated.

*(8) Providers Under Surveillance.* Certain physicians or hospitals, or certain categories of these, may have been designated for special intensive surveillance because of a record of previous improper use of services or the provision of inadequate care.

*(9) Certain Client Behaviors.* Complaints by patients are always a signal for careful case review. If it is desired to extend the definition of quality, as one should, to embrace nontechnical dimensions of care, other client behaviors might also be cues for intensive analysis. Noncompliance with physician recommendations, such as leaving the hospital against advice, would be one such event.

Another approach to the selection of cases for review is to examine all, or samples of all, cases identified as aberrant or deviant by some other component of the system of utilization and quality control. The need to verify by review cases that have been certified to stay in the hospital beyond specified periods of time has been discussed previously. This is an integral part of the system of Approval by Individual Diagnosis (AID) which has been described in a previous section. It constitutes the linkage of case review with a system of certification of hospital stay. Similarly, case review may be linked with a system of statistical review. There is another method of linkage which focuses on cases which are aberrant or deviant in a statistical sense. It is possible to identify cases that deviate in terms of ranges and percentiles, or standard deviations from the mean. It is further possible to introduce, as has been described, corrections for differences in several characteristics that include diagnosis, age, whether there is a secondary diagnosis. Wolfe (366) has described in detail the development of a statistical screening system of this type for one diagnostic category: operations on the bilary tract. Using regression analysis, Wolfe was able to reduce 355 variables considered likely to influence length of stay for this condition to five which explained 80 percent of the variation in length of stay. These were number of consultations, identity of the hospital, age, number of diagnoses during stay, and whether incision of the bile duct was or was not done. Using these control variables, the computer can identify cases that fall outside the expected length of stay. It is possible in each case to determine the mean length of stay and to set confidence limits. The strictness of the confidence limits determines the number of cases identified as "questionable" and designated for further case review.

By using Wolfe's system, one could adjust the sample size according to the degree of doubt about length of stay and depending on the resources available for carrying out case review. If it is desirable to reduce case review work to a minimum, one selects only cases in which the likelihood of inappropriate stay is very high (95 percent confidence limits). On the other hand, if one has the resources, and is unwilling to let cases go by even if there is reasonable doubt length of stay, one chooses a lower confidence limit (68 percent). It is to be noted, however, that the case review load increases very rapidly.

The claims review procedures of a health insurance agency may be considered as part of the utilization control process. Cases that are questioned by this process, or are refused payment, constitute another group of "high risk" cases that are subjected to case review.

### Effect of Certification and Volumetric Appraisal

Donabedian (77) has concluded that quality appraisal and utilization review may have at least two effects. First, the behavior of physicians in the management of care may be expected to change almost immediately due to the physician's awareness that their practice has been made visible to colleagues and to others, and that professional and administrative supervision is in force. The magnitude of this direct, immediate effect depends on the extent to which physicians are responsive to supervision with all its implications. A more gradual but direct effect might be expected as a result of the educational activities associated with the analysis and review of medical care patterns and of specific instances of management. The point is that a physician's practice may be below expectation partly because of deficiencies in knowledge that the review and appraisal activities would help to rectify.

Quality appraisal and utilization review activities can also have indirect effects. These occur when the result of appraisal reveals the need for changes and program modifications can bring about far-reaching changes in the quality of care, partly through altering physician behavior and partly through other means.

He has drawn attention to certain general features of the organization of medical care that either promote or hinder the effective implementation of quality appraisal and utilization control. Among the features hindering effective implementation is the tradition of autonomy in private practice, and the associated reluctance of physicians to interfere in each others' practices and to be publicly critical of each other. Morehead (77) found the unwillingness to be critical of colleagues a significant obstacle in the performance of certain judges recruited for the HIP studies.

The high degree of interdependence among physicians, with its professional, social, and economic consequences, is another major obstacle to implementation. As Donabedian has pointed out, it is unrealistic to expect a physician to be highly motivated to scrutinize the work of colleagues on whom he depends for referral. Nor is it likely that a physician on an audit committee will be overly critical when he contemplates the possibility that, as committee members rotate, he himself will be under scrutiny by the colleague whom he is expected to judge. The empirical observations reported by Sigmond (308) support these speculations. According to surveys of utilization committee activities in Western Pennsylvania, a number of chairmen felt that committee members were frequently hampered because of fear of antagonizing chiefs of service and colleagues. If, in addition, the organized hospital staff exercises little selectivity in granting staff privileges, the quality of care is likely to be little influenced by the presence of a formal review mechanism.

Certain conditions might increase the effectiveness of patient-care review. The rise of specialization, and the specialist's desire to see his particular competence recognized and institutionalized, is one such factor. Another is the presence of an effectively organized medical staff within the hospital. Although the central importance of staff organization has long been recognized by the Joint Commission on Hospital Accreditation (161), present levels may not suffice for reasons mentioned above. Further organization of the staff and increasing identification with corporate objectives may be necessary. This is brought about to some degree by the creation of a cadre of full-time members who can form an effective link between the institution (or program) and the private practitioner. Full-time status, especially when buttressed by membership on the faculty of a teaching institution, is associated with greater sensitivity to quality in practice, considerable immunity from the reciprocal obligations of the medical marketplace, professional prestige, and administrative leverage.

A final factor of general importance is the level of professional responsibility and competence represented in the administrative structure of the institution, or agency, that finances or provides medical care. Just as physicians must be organized in ways that render them more amenable to supervision of performance and quality control, organizations that finance or provide medical care must be professionalized in order to become more responsive to the imperatives of quality practice. Several mechanisms are available for use: professional advisory committees; professional health services administrators who may or may not be physicians; and full-time professional staff to perform a variety of policymaking, administrative, technical, supervisory and liaison functions.

# COST CONTROL METHODS IN HEALTH CARE DELIVERY

by Stanley Werlin

## I. INTRODUCTION

This paper summarizes the state-of-the-art of cost control practices in health care delivery, and has been prepared as background material for the development of conceptual prototypes of Professional Standards Review Organizations. The paper divides cost control methods into four classifications which are all germane to PSRO's, with major emphasis placed on methods used by risk-bearing organizations, and within that section, on claims review. This was done due to the concept that claims review is related to, yet separate and distinct from, the assessment of quality and appropriateness of care which forms the rationale for PSRO's.

## II. COST CONTROL METHODS USED BY INSTITUTIONS/PROVIDERS

A number of cost control methods are available for use at the institutional level of the health care delivery system. Those that will be discussed in this section include financial administration, automation, shared services, and paramedical personnel.

### A. FINANCIAL ADMINISTRATION

Two methods available to health care institutions for administration of cost control procedures are budgeting and cost accounting. Since there is nothing unique about the application of these two management tools to health institutions, their descriptions will be brief. Budgeting, if used appropriately for management control, can pinpoint areas where cost control is needed, while at the same time focuses on areas where performance is better than expected. The principal value of budgeting as a cost control mechanism, however, is its ability to develop an awareness on the part of department or section managers about their expected performance as well as making them conscious of costs due to their direct involvement in the budgeting process. Coupled with wise management direction, budgeting can exert considerable influence on costs. More will be said about this subject as it relates to cost control later in this paper.

Cost accounting performs essentially the same function as budgeting by generating reports to management concerning total costs in various areas of operation and unit costs for various services. While cost accounting exerts no direct influence over department or section leaders, it nevertheless can be an aid to management in pinpointing areas of climbing costs as well as areas of efficiency.

## B. AUTOMATION AND MULTIPHASIC SCREENING

It has been argued by many authorities that automation can achieve significant cost savings when applied on an interhospital or shared basis, and smaller, but still meaningful savings, when used by a single hospital. Computers can be successfully applied to a health care institution's business operations, patient records, patient monitoring, drug distribution system, diagnostic testing, and laboratory analyses. While there are many documented instances of cost-savings for each of the above applications of Electronic Data Processing to health care, perhaps the most widely publicized use of automation in health care is the automated multi-test, diagnostic laboratory, generally termed multiphasic screening.

The process of multiphasic screening is listed in this section because it incorporates an array of cost-saving automated techniques(15). It also serves another, more fundamental cost control function by regulating entrance to the physician side of the health care delivery system in a more appropriate manner than by the traditional price-oriented regulation system. The notion of a price system serving as a regulator of market demand is basic to the discipline of economics and finds its raison d'etre in the need for a mechanism to allocate resources among competing demands. However, this system of regulation is less than desirable in the market for health care. The physician's fee can cause people to postpone visiting the physician until they are actually ill, thus minimizing the number of healthy or early-sick people who enter the system. Eliminating the fee, which is essentially the effect of insurance coverage of physician services or subscription to a group practice prepayment plan, presents the consumer with a situation of zero price in which most consumers demand physician services, whether they are well, worried, or sick. While encouraging people to visit the physician is a desirable action, the consequent use of physician time is an undesirable result. A proposed solution to this dilemma is to use multiphasic screening *within a zero price framework.*

The Kaiser prototype of a multiphasic screening program is a computerized medical history followed by a series of physiological tests given by paramedics and analyzed, to the fullest extent possible, via Electronic Data Processing. Based on the multiphasic screening test results, the computer then decides either to send the patient home, order further tests, or arrange an appointment with a physician. The system thus maximizes physician time for non-routine purposes, maximizes skills of paramedical personnel, and minimizes hospital use for diagnostic purposes. Each of these system attributes contributes to cost containment via the resulting appropriate and efficient use of health services.

## C. SHARED SERVICES

It has been true in the past and continues to be so today that in an urban or suburban setting where a multiplicity of hospitals exists to serve the same population group, each hospital acts to increase its own range of services. Reasons often cited for such behavior include the needs of the medical staff, the needs of teaching programs, the philosophy of the hospital Board of Trustees, community pride and expectation, and the desire to provide a true range of comprehensive services. Nevertheless, what is optimal for an individual hospital is not necessarily optimal for the entire hospital complex, and in terms of controlling health care costs, it is the latter that is the key issue for shared services. Typically mentioned as examples of expensive duplicated services within a single service area are facilities for open-heart surgery and high-energy radiation therapy. Where such services do exist in excess, they are underutilized on an individual basis and the aggregate absorbed overhead cost for the combined hospitals is quite large. Until hospitals in close proximity adopt a system-oriented philosophy and learn to cooperate to provide comprehensive services at an appropriate level, cost control in this area will have to rely on public pressure, via legislation and/or planning authorities whose recommendations or mandates must be followed.

While there are some types of services that every hospital in an area need not render, there are also some that must be available to every hospital which, if provided on a shared basis, can achieve economies of scale and consequent cost savings. These services include purchasing, lab facilities, medical records, food service, laundry, Electronic Data Processing, etc. Examples of cost saving by shared purchasing are volume discounts, standardization, and control of quality; for laundry, a workload large enough to support investment in machinery, reduced inventory levels for individual hospitals, and space saving within each participating hospital; and for laboratory facilities, economies in equipment, materials, and personnel, as well as reduced costs of overhead from infrequently used materials and testing equipment. There are similar savings to be had in the other areas mentioned, again due to the fundamental rationale for shared services: economies of scale.

## D. PARAMEDICAL PERSONNEL

The notion of efficient manpower utilization centers on the appropriate use of skilled personnel. In the health field, where physician compensation is extremely high, inappropriate use of physician services results in inefficiency, lower productivity, and ultimately higher costs to the consumer. Currently, inappropriate use of physician services is a frequent occurrence; a physician's level of medical proficiency is not required for many of the services performed by physicians today. This situation continues to exist for at least three reasons. One is the very limited supply of paramedical personnel available due to the only relatively recent discovery of their potential in the health field. A second is that restrictive licensure legislation still applies to paramedics, either by limiting their activities or by refusing entirely to sanction their use by health providers, thus leading to the sub-optimal allocation of health manpower resources. Finally, physician resistance to paramedics is often strong, due to a variety of reasons including economic self-interest, the role a physician sees for himself (specialist or generalist), and the problem of medical responsibility. Nevertheless, the cost control potential of paramedics remains high. Appropriate use of paramedical personnel can help to alleviate shortages by delegating to paramedics the simple, more routine physician tasks and freeing the physician to handle patients more in need of his highly skilled level of training (60). Such a physician-paramedic tandem ought to reduce fees for basic services due to the lower compensation levels of paramedics, or, if applied in a group practice setting, increase the comprehensiveness of benefits, which if properly utilized simply amounts to another form of cost control.

## III. COST CONTROL METHODS USED BY RISK-BEARING ORGANIZATIONS

The emergence of the health insurance industry after World War II and the phenomenal growth in population covered by some form of health insurance, coupled with the alarming escalation of health care costs over the past decade, has fostered a strong concern for and commitment to cost control on the part of third-party payers. A myriad of cost control techniques aimed at the consumer, the physician, and the hospital have been developed and implemented with varying degrees of success. This section will discuss the following methods of cost control: for the consumer, cost-sharing; for physicians, UCR, fee schedules, and relative value schedules; for hospitals, Medicare, Blue Cross and inclusive rate reimbursement; and for both hospitals and physicians, claims review. In addition, current and recent experiments in incentive reimbursement will be discussed. Special emphasis will be placed on models of the claims review process due to that method's particular relationship to assessment of quality and appropriateness of care.

### A. COST SHARING

Cost sharing is a cost control technique directed at the purchaser of a health insurance policy and is designed to force the consumer to pay for part of his health care under certain circumstances. The basic purpose of cost-sharing is to reduce expenditures and inappropriate utilization through the reduction, and hopefully, elimination, of moral hazard, i.e. the tendency for people to act as if the price of medical care were zero due to the presence of insurance coverage, and therefore, to demand more care than if they were not insured (50). Cost-sharing may take four forms, deductible, coinsurance, copayment, and indemnity. A deductible clause in a policy states that the cost of care up to a certain fixed dollar amount must be paid by the patient. Coinsurance, or percentage participation, refers to the patient's obligation to pay for a certain percentage of his care. Copayment, in contrast, means that the consumer must contribute a certain fixed sum toward his bill. Both coinsurance and copayment usually apply to that portion of a claim remaining after application of the deductible. Finally, the concept of indemnity, while not usually thought of as a cost-sharing method, can be used for that purpose. An indemnity schedule sets a certain sum to be paid directly to the consumer depending on what services were received. By setting the reimbursable amounts at less than full payment for the services rendered, the insurance company can effectively impose cost-sharing on the consumer.

Cost-sharing as a cost control technique is rationalized in three ways. First, it is claimed that it reduces the cost of insurance premiums. Although this seems intuitively true, the additional administrative expenses incurred with cost-sharing cast some doubt on the statement's validity. In addition, even if the statement were true, taken by itself it says nothing about reducing total costs to the consumer. The essence of this claim is really that cost-sharing is used for marketing purposes more than cost control purposes. Second, it reduces a potentially large volume of small claims handling if a deductible is used. Third, it may reduce unnecessary utilization (moral hazard). The effectiveness of cost-sharing as a cost control technique depends in large part on the validity of the third argument.

A number of studies have been conducted from which it is possible to draw some conclusions about the effect of cost sharing on hospital utilization. Diokno (31) found in a study of an indemnity insurance plan versus a full coverage plan that utilization was higher under the full coverage plan, thus lending support to the critical argument discussed earlier. A study of the Blue Cross of Virginia (50) showed that the addition of cost-sharing provisions to subscriber contracts reduced utilization. A comparison of Blue Cross plans (170), some of which had cost-sharing provisions and some of which did not, found lower utilization among those with cost-sharing. In a study of alternate contracts provided by Michigan Blue Cross, one providing full coverage and the other featuring deductible provisions, much lower utilization by subscribers of the latter contract was discovered. Two similar studies of utilization data before and after the introduction of cost-sharing provisions on subscriber contracts, one in Saskatchewan (50), the other at Stanford (128), both showed a large drop in utilization after cost-sharing became effective.

While the studies cited above all support the contention that cost-sharing reduces utilization of health services, two caveats are in order. First, it is not possible to discern whether necessary or unnecessary utilization was reduced. Cost-sharing hopes to attack the latter while not affecting the former. To the extent that it also affects the former, it is exercising cost control inappropriately. Second, there are a number of studies which reach the conclusion that cost-sharing is an ineffective cost control mechanism. Comparisons of utilization data from two Pennsylvania Blue Cross plans (57) showed no utilization differences despite the fact that one plan featured full coverage while the other had a copayment provision. In Connecticut (60), statistically insignificant increases in utilization were found among groups of subscribers changing from an indemnity contract to a full service contract. Finally, further support for the contention that cost sharing is an ineffective cost control mechanism is found in a study comparing a plan with a deductible to a plan offering full service in which no utilization differences occurred (72).

Of course, there are methodological and statistical limitations to all of the studies mentioned. Nevertheless, Ginsburg and Manheim (50) conclude from the above that consumer cost sharing does affect utilization of medical care, and that the magnitude of its effect depends on demographics, price, and the extent of services provided. Hall (56) is not prepared to draw the same conclusion, claiming instead that while there is more evidence that cost-sharing reduces utilization than that it has no effect, the evidence is still such that it leaves the issue in doubt.

An interesting slant on the contention under consideration may ultimately decide the issue. Weisbrod et.al. (165) have advanced the hypothesis that there is no middle ground in this area, i.e. that utilization will be totally unaffected unless the price framework in which consumers make their decision to purchase health care is a zero price framework. Their argument is essentially that any cost-sharing provision completely negates the effect of moral hazard. The subtlety of their argument lies in the fact that they deny the idea that cost-sharing must be applied at a reasonably high level (deductibles near $50, coinsurance rates of 20 percent) to be effective. They contend, then, that small cost-sharing provisions may be as effective as large ones for purposes of cost control. The validity of this argument would mean that the issue of cost-sharing as a burden to poor people and the disadvantaged, and therefore as an undesirable feature of insurance contracts, could be resolved gracefully by using small cost-sharing provisions that would minimize or essentially eliminate the burden to the poor while at the same time result in stable utilization. Their study referenced above supports this hypothesis.

## B. PHYSICIAN REIMBURSEMENT TECHNIQUES

### 1. Usual, Customary and Reasonable Fees

The usual, customary, and reasonable (UCR) fee approach to physician reimbursement grew out of the reasonable charges model of the Medicare legislation and is now an accepted form of cost control by third parties. Usual in this context means the usual fee charged by a physician for a given service.

Customary means the fee corresponds to fees charged by similar physicians in the same geographical area for the same service. Reasonable has come to imply a fee level calculated from a distribution of the fees of physicians who have been grouped as similar. A maximum reasonable fee is calculated by applying an arbitrarily chosen percentile cut-off to the distribution of fees under discussion. If the fee appearing on a claim is usual, customary, and reasonable, it will normally be paid without further delay. If not, the fee may be reduced or negotiated.

To develop UCR guidelines, third parties normally require physicians to pre-file their fee schedules, which, combined with data on individual physicians available from previous claims over a period of time, enable the insurance carriers to perform the appropriate calculations. Usual fees are determined either by taking the fee a physician charges to an overwhelming majority of patients or by taking the median of the fees a physician has charged for a given service. There are a number of methods available to determine customary and reasonable fees of similar physicians in a given geographical area. One is to take all physician charges for a given service, set up a profile of the group, and apply a percentile cut-off. While this method weights all physicians equally, a second method which weights them unequally may be preferable. This method involves taking all *claims* for a given service, developing a profile, and applying the cut-off. This calculation takes into account the fact that not all physicians deliver the same range of services, nor do they necessarily serve the same population groups within the given geographical area, a fact that may lead some physicians to render more of one service than other physicians might. A third method is to find the customary and reasonable fee by both methods discussed above, and take the higher, the lower, or the average of the two. While third parties may normally choose the percentile cut-off as they wish, Medicare fiscal intermediaries must make the cut-off at the 84th percentile (one standard deviation).

The key to cost control with UCR is that it does not permit a physician's fees to exceed certain guidelines, thus putting an upper limit on costs. With an appropriate surveillance apparatus, UCR could theoretically serve as a reasonable cost control mechanism. Furthermore, even though physicians are of course permitted to revise their fee schedules upward, the fee schedule changes are not recognized immediately, but are subject to 3-12 month delays. Thus overall costs are held down, and fee increases may be discouraged.

Unfortunately, UCR has problems in both methodology and effectiveness. While a percentile cut-off to determine a maximum reasonable charge might be appropriate in a narrow range of fees with only a few real deviations from a cluster, such a mechanism of cost control might well be inappropriate in a widely spread distribution. Furthermore, the percentage cut-off results in physician knowledge of what is and what is not an acceptable fee. A physician can therefore determine what kind of fee increases will be tolerated, and may make his adjustments accordingly. At a minimum, a physician can be expected to move to the average fee if his fee is lower than average. UCR can thus lead to a self-generating increase. Furthermore, the possibility that physicians may fear a change in the percentage cut-off might tend to create movement to higher fees as quickly as possible. One possible modification of UCR to avoid these problems might be to eliminate pre-filing of fees and pay the physician his usual fee while using spot check audits for surveillance purposes.

Another problem with UCR is that often a fee that falls outside the UCR guidelines is nevertheless justifiable due to special procedures or circumstances. Not to pay the fee is to be clearly unjust to the physician. At the same time, to look over every claim for special procedures would involve enormous administrative expense. How to balance equitable reimbursement to the physician without incurring additional administrative expense remains a problem for UCR.

A third problem for this method of cost control is that the delay in recognition of fee increases may actually be counterproductive. While it appears to be a reasonable way to keep expenditures down, such delays (once they are recognized by physicians) may stimulate increases sooner than they would normally occur.

A much more fundamental problem for UCR, which exists for other cost control mechanisms used under the fee-for-service system as well, is the fact that while unit or factor prices may be controlled, expenditures may not be controlled due to overutilization. While cost control is the issue under discussion, expenditure control is an equally important issue. The health care crisis is not only a crisis of escalating unit costs; it is also a crisis of escalating total costs. Expenditure control, since it focuses on the problem of utilization, is an issue that is not addressed by any of the reimbursement techniques to be discussed in this paper. However, the sections on claims review and group practice prepayment plans both recognize expenditure control as a vital issue.

In the final analysis, reasonable charges reimbursement via UCR comes to mean physician-determined charges. Whatever fees physicians as a group determine are reasonable are the fees paid. While the physicians are supposed to be the controlled, they are in point of fact the controllers, and it is the very process of calculating a usual, customary, and reasonable fee from physician-determined data that limits the effectiveness of UCR as a cost control mechanism.

### 2. The Fee Schedule

This reimbursement technique is the Blue Shield model of contractual arrangements with all physicians coupled with a uniform fee schedule for services and beneficiary income limits. It has the provision that a physician can charge more to certain patients than to others (depending on family income) and collect the difference between Blue Shield reimbursement and his charges directly from the patient. Cost control is exercised via the physician's obligation through the contract to accept the Blue Shield fixed fee as full reimbursement for his services if the patient's income is within the prescribed income limits. The weakness of this method of cost control is that it permits a physician to charge whatever he wants to patients whose income falls beyond the income limits. Thus only partial cost control is exercised by the fee schedule approach as implemented by Blue Shield.

While elimination of income limits would make the use of fixed fee schedules more effective, their practicality is still quite limited. No quality considerations are given in a fixed fee schedule. Without a range of fees that recognizes qualitative variations in services, physicians would, with good reason, never adhere to fixed fee schedules. With a range of fees, however, some of the cost controlling power of a fee schedule is lost, and the schedule is certainly no longer fixed.

### 3. The Relative Value Schedule

The concept of a relative value schedule (RVS) which is now in use in a number of localities became widely known through its origins in California. The RVS was developed from data on fees charged by California physicians for their medical services. Median charges for each procedure are statistically determined, and the RVS reflects the ratios that exist between these median values by assigning an appropriate unit value to each procedure. Thus if the median charge for one service is $100 and the median charge for another is $20, the RVS will reflect this 5:1 ratio with a 5:1 ratio in unit values assigned to the two services under consideration.

Wide variations from the state-wide RVS may exist, both within geographical subdivisions of the state and certainly with individual physicians, in the relative values of the appropriate fee schedule. Keeping this and the fact that the RVS reflects ratios of median values in mind, an RVS can nevertheless be useful in three ways: 1) to physicians, to assist in fee-setting; 2) to insurance carriers and governmental programs, either as guidelines for reimbursement or as a formal policy requiring the compliance of all participating physicians; 3) and to both, to provide a coding system for services that is universal and which facilitates claims processing if used by both physician and third party.

The California RVS is divided into five sections: medicine, anaesthesia, surgery, radiology/nuclear medicine, and pathology. Such a division of services is appropriate not only to retain simplicity in unit values assigned to each service, but also to reflect the differences in overhead costs for each division. The RVS is in no way comparable to a fixed fee schedule; it is a sophisticated instrument which makes provision for special services and modifications that allow a physician to alter his fee if the service rendered does not precisely fit the prototype description in the RVS. Examples of this flexibility are modifiers that permit increases in fees to reflect special supplies, night visits, etc., and other modifiers that indicate a reduction of fee for multiple surgical procedures and incidental procedures.

As mentioned above, the RVS in no way provides estimates of fees in an absolute sense; physicians who use the RVS to determine fees are encouraged to do so by estimating the value of their services, the time and materials spent in supplying such services, and the economics of their own practice. A simple procedure for calculating the money value of an RVS unit of service for each section of the RVS is to use the physician's own fee schedule. To arrive at a fee schedule based on RVS, then, is only a matter of multiplying the money value of one RVS unit by the number of units assigned to each service.

Use of the RVS as a surveillance technique allows monitoring of the consistency of fees in a relative sense. However, if used as a policy instrument by insurance carriers to control the reimbursement to individual physicians, application of RVS to effective cost control is hampered by a variety of factors. The real issue of cost control revolves around absolute costs. If, for example, the insurance carrier only reimburses the physician up to the RVS-determined value of his services as calculated from his own fee schedule which is available in the carrier's data base, and the physician can collect any excess from the patient, then there is no cost control. Furthermore, even if the physician agrees to charge only the RVS-determined fee for his services (by contractual agreement with the insurance carrier), the fee itself is dependent on the absolute level of his fee schedule, which in turn depends on an individual's skill, education, age, status, malpractice insurance costs, etc, which can vary widely among physicians. Since the absolute level of fee schedules is the dominant force in cost control here, application of the RVS norms to the relative values of a physician's fees may be, at best, a marginal action. More importantly, for every physician who discovers that the insurance carrier will not reimburse his full fee because his relative values are out of line on the high side, it is just as likely that another physician will discover his fees are out of line on the low side and adjust accordingly. In emphasizing consistency of fees, an RVS may actually be of little aid in controlling costs unless accompanied by absolute fee norms and a workable surveillance mechanism.

## C. HOSPITAL REIMBURSEMENT TECHNIQUES

### 1. The Medicare Model

Medicare legislation provides that hospitals participating in the Medicare program should be reimbursed on the basis of reasonable costs. This is due to the prevailing philosophy in the legislation that the Medicare program ought to pay the actual cost of providing care to its beneficiaries and not subsidize any other hospital users (159). In addition to the cost of actual services and supplies, legitimate hospital costs that are fully reimbursable include contributions toward increases in working capital, mortgage amortization payments, capital improvement and expansion, depreciation, and imputed interest on net capital investment.

The Medicare program reimburses hospitals on an interim basis, with a final accounting and adjustment at the end of the hospital's fiscal year. While interim reimbursement is important to the cash flow of the hospital, the issue of cost control is only addressed via final accounting and adjustment. All hospitals are expected ultimately to use the departmental ratio of Medicare charges to total charges applied to total costs (RCCAC) for this purpose. With this method, the ratio of charges to Medicare patients to charges to all patients is calculated for each department. The total costs of each department are then multiplied by the ratio to determine that portion of costs that should be allocated to Medicare and therefore reimbursed by Medicare. Note that this calculation depends on the charge structure of the hospital. If charges are related to costs, then Medicare will probably pay about what the legislation says it ought to pay. On the other hand, if charges are not related to costs, as is often the case in hospitals today, then Medicare might pay more than its responsible share. This is a critical weakness of RCCAC as a cost control mechanism. With non-cost-related charges, the ratio of Medicare charges to total charges can be manipulated in favor of the hospital either by increasing Medicare charges or decreasing other patient charges, since reimbursement does not relate to charges, but to costs. Partial control of the amount reimbursed is thus put in the hands of the hospital, with no control over its manipulation of charges (70).

A more fundamental question ought to be asked at this point as to whether cost-based reimbursement is even a conceptually viable cost control mechanism. Cost reimbursement is criticized as promoting inefficiency, or at least providing no incentives to economize. Realistically, what cost-based reimbursement does is to guarantee reimbursement for costs that are not determined in a competitive market, not regulated by public authority, and not subject to significant internal control. There seems to be very little doubt that cost control is not being effected under these circumstances.

### 2. The Western Pennsylvania Model

A more sensible approach to cost-based reimbursement is to couple it with a maximum payment schedule. Such a program is in use by Blue Cross of Western Pennsylvania (93). Hospitals are grouped by metropolitan/urban/nonurban divisions, then by advanced teaching/teaching/non-teaching divisions to form nine hospital categories. The average costs of each group's services are calculated, and reimbursement to a hospital is limited to 110 percent of the group's average costs. Semi-annual audits are conducted, and hospitals can appeal the ceiling limitation when it is perceived to be unjust. While reimbursement still relates to costs, there are at least incentives in this model for high cost hospitals to reduce their costs or face less than full cost reimbursement.

### 3. The Blue Cross Model

The large majority of Blue Cross plans provide cost-based reimbursement to hospitals through contractual arrangements. A schedule of per diem payments based on the hospital's charges is developed by Blue Cross and the hospital; the normal Blue Cross payment ranges from 80 percent to 100 percent of charges. While the previously-mentioned inefficiencies of cost-based reimbursement apply to this model, they are tempered somewhat by Blue Cross efforts to police hospital costs. Cost control in this model stands or falls, then, on the nature of the policing effort.

### 4. The Inclusive Rate

One important element of hospital costs is the preparation of claims for submission to insurance carriers. Many hospitals use an average billing rate for some services, but itemize the large majority of ancillary services. A recent HEW study indicates that while very few hospitals currently utilize an inclusive rate system, cost control can be exercised by its use (158).

An inclusive billing rate attempts to approximate expected usage of services by the hospital's patients as closely as possible without resorting to itemization. In no sense, however, should an inclusive rate be thought of as a synonym for a hospital-wide average cost per patient day. Rather, hospitals using such a system categorize their patients according to patient characteristics, type of care characteristics, accommodations, etc., so that a rate with the name "third day, over 65, surgical, intensive care" qualifies as an inclusive rate as long as it is applied to the third day of stay of all patients over 65 who are hospitalized for surgery in the intensive care unit. Generally, an inclusive rate ought to take into consideration such indices of patient differentiation as diagnosis, category of care, day of stay, type of accommodation, age, and excluded items.

Results of the HEW study show that for both inpatient and outpatient care, significant savings can be achieved in accounting system operating costs with the adoption of inclusive rates. For inpatients, for whom an average of 14 ancillary services are currently processed per patient day, an estimated saving of 37 percent of accounting costs would be achieved with this system, due to smaller staff requirements in the business office, less use of data processing equipment, and a reduction in accounts receivable due to enhanced ability to present a bill to the payer, whether third party or the patient, on the day of discharge rather than after waiting for all late charges to filter through the accounting system. While estimates of savings in outpatient accounting costs are also significant (20 percent), the applicability of inclusive rates to outpatient departments is limited due to the much wider variation in outpatient charges among hospitals and the relatively small size of the total bill. For these reasons, averaging, even across limited categories, may not be able to gain wide acceptance for outpatient services, and uniform charges, if high, might easily discourage patients against receiving care.

Besides demonstrable cost savings, there are two other arguments in favor of inclusive billing rates. One is that patient anxiety will be decreased since the total bill can be predicted within reasonable boundaries if the length of stay can be estimated. While legitimate, this argument is neutral with regard to cost control. The other is that physicians can practice without thinking about the patient's financial resources. This argument does not speak well for the proponents of inclusive rates. On the one hand, there is an implication that physicians may currently compromise quality of care for the patient's financial sake, and thus underutilize services. On the other, if the first implication is not true, then the argument suggests utilization may increase. The latter seems more valid; if so, it is an argument in opposition to inclusive rates rather than in favor of them.

There are other, more telling arguments in opposition to inclusive rates, the most important of which revolves around the question of utilization review. Inclusive rates are, for all practical purposes, in opposition to the overwhelming trend toward utilization review and control. By doing away with itemization of ancillary charges, inclusive rates make it much more difficult to monitor typical utilization review parameters. In all likelihood, inclusive rates will not properly reflect patterns of ancillary services utilization for a third party's subscriber population. Since effective cost control is linked to utilization, and because all current systems are geared to itemization for audit and utilization review purposes, it is difficult to rationalize movement away from a cost control system that has just recently come into existence and which has begun to show its effectiveness.

The tendency for costs to rise due to reduced audit ability is another argument against inclusive rates. In addition, inclusive rates do not conform to the philosophy of equity as stated in the Medicare legislation, and would have acceptance problems for that reason. Finally, cutting patient differentiation categories too finely might result in the need for an accounting system which would reduce or eliminate all cost-savings attributable to reduced ancillary accounting needs under the itemization system. While the desire to eliminate itemization of frequently received ancillary services via inclusive billing rates is logical and cost-conscious, its neglect of the larger cost control question, utilization, will probably mean that use of inclusive rates will not expand from the less than 1 percent of all non-government hospitals that currently use them.

## D. INCENTIVE REIMBURSEMENT MODELS

The critical problem with cost-based reimbursement for hospitals, as discussed in preceding sections, is the lack of incentive for efficiency, economy, and cost control. In an effort to alleviate this problem, a number of reimbursement mechanisms with incentives for cost control have been implemented and are designed to reward the efficient while penalizing the inefficient.

### 1. The Philadelphia Blue Cross Model

One of the earliest experiments in incentive reimbursement, which took place in the early 1950's, varied reimbursement rates according to length of stay. Blue Cross paid hospitals more than their average costs for the first two days of stay, followed by progressively lower rates as the duration of stay lengthened. The incentive to hospitals was a financial gain if a patient were to be discharged early. Combined with an appropriate monitoring mechanism to guard against underutilization, this model, though subsequently abandoned by Philadelphia Blue Cross, could be used after appropriate modification.

### 2. The Northeast Ohio Blue Cross Model

Also instituted in the 1950's, this model provided cash awards to hospitals keeping cost increases below the average for a given geographical area. If a hospital were able to achieve cost increases below average, it was given 20 percent of the difference between its costs and average costs to be used for capital improvement, teaching, or research. With appropriately grouped hospitals, this model might prove workable. Geographic grouping, however, fails to take account of hospital characteristics which defeats the purpose of the concept.

### 3. The Target Rate Model

This is one of a number of HEW-authorized experiments in incentive reimbursement that commenced during 1968-1969 (157). Involving the Greater New York Hospital Association, Blue Cross of New York, and Medicare, this model set target rates for total hospital inpatient costs with minimum and maximum payments on both sides of the target rate. In no case would a hospital receive less than the minimum, nor more than the maximum, for reimbursement. Thus if a hospital's costs came in under the minimum, the hospital would receive a financial reward; if between the minimum and maximum, no reward; and if over the maximum, a penalty in the form of partial reimbursement.

A variation of the target rate model was instituted by the Medicare program in conjunction with the Connecticut Hospital Association. Targets were set on a departmental rather than a hospital-wide basis. If costs were lower than the target set, the hospital would receive the target rate or a payment calculated from the Medicare reimbursement formula, whichever was higher. If the hospital were on target, it would receive the reimbursement formula payment, while if its costs were higher than target, it would receive 98 percent of the reimbursement formula payment as a penalty.

The crucial problem with target rates is that hospitals could lower their costs by keeping patients an extra day while rendering no medical services. Targets would be reached at the cost of increasing expenditures. It would appear that to make target rates effective requires the simultaneous use of outside utilization review to prevent such manipulation.

### 4. The Individual Hospital Negotiation Model

As another HEW experimental model, this program was developed in collaboration with the Hospital Cost Analysis Service (HCAS) of Maryland. It features a revamped cost reimbursement formula with outside review and upper limits on reimbursement. Departmental costs are reviewed by HCAS, taking into account trends, the hospital's previous cost experience, and comparative costs in other hospitals, and an upper limit on reimbursement is set. If, during the course of review, difficulties are uncovered, then a joint HCAS-hospital conference is held to pinpoint the problem with special emphasis on providing assistance in revamping accounting and management control practices. Rewards and penalties similar to those used in the target rate model are also used. While administratively cumbersome and expensive to analyze each individual hospital, the value of the system lies in its theoretical ability to prospectively influence or stabilize costs. No retroactive adjustments are permitted as in the basic Medicare RCCAC reimbursement model.

### 5. The Georgia Medical Care Foundation Model

This program affects Medicaid payments to hospitals for inpatient care in Georgia (33). Payments are made according to the following method: expected average lengths of stay are determined from Southern Region PAS data by five age groups (0-19, 20-34, 35-49, 50-64, 65+) according to diagnostic and surgical categories. A lump sum payment is then made to hospitals by multiplying the expected average length of stay for the patient by the daily reimbursement rate established for the hospital by the Medicaid program. Thus the hospital receives a fixed payment for each patient no matter how long or short his actual length of stay may be. The incentive to keep length of stays down via effective utilization review is clear. Successful utilization review means financial rewards; unsuccessful review means no reimbursement. What happens to quality of care remains an issue here. If patients are discharged before they are medically ready, or if important pre- or post-operative procedures are deleted from patient protocols in order to shorten length of stay, then this incentive reimbursement model is an inappropriate one. To be acceptable, it must operate with a utilization review committee in which underutilization receives as much attention as overutilization.

## E. PROSPECTIVE BUDGET REVIEW

The concept of prospective review of costs is also found in the idea of prior budget review. Payments are based on projected budgets negotiated in a joint review session prior to the commencement of the fiscal year. Desirable features of this model are that hospitals must project expenses and the expected volume of services, in itself a stimulus to administrative thinking, and that review of budgets can be made before costs are incurred, a refreshing change from retrospective review of a hospital's costs. This model can serve to eliminate the problem of retroactive rejection of claims that has plagued the health care financing system in recent years, as well as to warn hospitals in advance that certain projected costs will not be reimbursable if incurred. To insure fairness to all concerned parties, hospitals, insurance carriers, and the community, such a program ought to be carried out by a state regulatory or planning agency. This stipulation is made to insure that no third party dominates the health insurance market completely. The most significant drawback to prior budget review is that if this year's budget is based on last year's cost experiences, then the system is really one of cost-based reimbursement. This is not entirely satisfactory as a cost control technique, for reasons previously mentioned.

### 1. The Rhode Island Model

A combination of prospective reimbursement, financial incentives, and negotiated budgets make this model of cost control with incentive reimbursement quite intriguing (15). Each Rhode Island hospital must first submit its budget for the coming fiscal year to the Rhode Island Hospital Association for review by a committee of representatives from each hospital. After reworking, the budgets are then sent to Rhode Island Blue Cross for review and negotiation before the fiscal year begins (the exceptionally large share of the health insurance market held by Rhode Island Blue Cross accounts for its critical role in the budgeting process). Prospective rates of payment are derived from the final approved budget, which cannot be changed except if hospital utilization falls outside the range of utilization parameters written into the contract. At the end of the year, a final accounting of costs is made, with any excess of reimbursement over costs shared by Blue Cross and the hospital. If costs exceed reimbursement, the hospital must absorb the loss as a penalty.

Some details of the plan deserve mention. Budget calculations are broken down into actual operating expenses the previous year, projected operating expenses, capital budget, and projected operating statistics. When budget negotiations are completed, Blue Cross calculates prospective reimbursement rates in four categories: routine inpatient services, nursery and delivery room services, outpatient emergency treatment, and ancillary services (inpatient and outpatient). Utilization parameter boundaries within which utilization may fluctuate without changes in the reimbursement rates are: total patient days, ±2 percent; ancillary services revenue ±10 percent; deliveries, ±5 percent; outpatient visits ±5 percent; and home care visits, ±5 percent. Finally, monthly and quarterly monitoring of progress is done to identify problems while they can still be adequately handled.

The key to the success of this model is cooperation and a strong sense of commitment by all Rhode Island hospitals to make significant inroads with health care cost containment in Rhode Island. The hospitals have overcome their reluctance to share cost figures and budgets, and now do so willingly, recognizing the need to avoid individualistic thinking in a system setting.

### 2. The Western Pennsylvania Point System Model

The heart of this model is the prediction and evaluation of hospital costs using the technique of multiple regression combined with a point system for weighting purposes. In conjunction with prospective reimbursement or target rates, such a model can be an effective cost control mechanism (136).

The idea of a weighting system in hospital reimbursement is not new. In the 1940's, the Agnew point system used a panel of judges to allot points up to a stated maximum to each hospital for each facility and service, based on the criteria of adequacy, procedures, and personnel. The total points were then multiplied by some predetermined rate to find a per diem reimbursement rate. The advantages of the system were many. Hospitals were reimbursed according to their ability to provide comprehensive care. Quality facilities and personnel were rewarded by higher point totals. The size of the hospital was not the key factor in determining the amount reimbursed. Old or unnecessary facilities were often eliminated. Despite all of these assets, however, the system eventually failed because points weren't cost-related.

The concept of the Western Pennsylvania model is to find those variables that account for large differences in costs among hospitals, develop weights for each variable, and use the weighted variables in a multiple regression for cost estimation and prediction. The actual model tries to avoid, insofar as possible, factors that can be manipulated by hospitals to affect reimbursement, and uses the following seven variables: location, size class, services, education, case mix, medical staff, and outpatient activity.

*Location* was divided into four classifications; metropolitan, urban, non-urban, and Pittsburgh. Average daily census was used to determine *size class*, although other possibilities would include number of beds or average daily admissions. *Services* included 20 extraordinary inpatient services hypothesized to have a significant effect on the cost structure of hospitals. Ideally, an index of the number of services, the frequency of their occurrence, and their quality and technical level ought to be developed. *Education* was included by the use of an index representing the number of interns and residents and the types of schooling and training programs available in the hospital. *Case mix* was measured as a function of the talents of the medical staff on the assumption that the abilities of the medical staff affect what kind of patients will be seen at the hospital. An index determined by the numbers of Board-certified, Board-eligible, and other staff physicians represents *medical staff*. *Outpatient services* were included by the ratio of outpatient charges to total charges, giving a reasonable approximation of the effect of the outpatient department on costs. Weights for the variables were developed by a complex system described in the article referenced above.

The seven variables were used as independent variables in three regression models, one linear and two non-linear, with total audited cost as the dependent variable. Based on the predictive ability of the three models for 1970 cost experiences of Western Pennsylvania hospitals, one of the non-linear forms was chosen as optimal.

The two principal applications of this model are for control and evaluation, and incentive reimbursement. For evaluation purposes, percentage limits of deviation on both sides of predicted costs can be set, with investigation of those hospitals which exceed the limits for purposes of improving operations and reducing costs, and investigations of those falling below to develop models of exemplary cost control practices.

A model of incentive reimbursement using the predictive regression can be easily developed. Third parties could use the predictive model to forecast a hospital's costs for the coming fiscal year. The hospital could either accept the forecast or ask for a budget review session. After this process, prospective reimbursement rates would be set, with percentage bands around the prediction to provide incentives, penalties, and maximum reimbursement levels. For example, hospitals might be fully reimbursed if costs fell between 97.5-102.5 percent of the predicted costs, share in all savings below the 97.5 percent level, be partially reimbursed from the 102.5-110.0 percent range, and absorb all costs exceeding 110.0 percent of predicted costs.

Advantages of this system are that each hospital's predicted costs are based on its individual attributes; hospitals are not classified into broad-based categories; it is difficult for hospitals to manipulate the variables to increase their reimbursement; and an expected level of costs is established as a target. The principal disadvantage is that the explanatory variables in the model are not as precise as would be desirable. Nevertheless, initial experience has indicated the model's ability to produce very accurate predictions.

## F. CLAIMS REVIEW

Before proceeding to a discussion of the many claims review models included in this paper, some introductory comments are appropriate. Claims review is becoming an increasingly more important method of cost control in the health care field as its ties to the concepts of utilization review and peer review become stronger. Basically, claims review systems hope to compare claims data against established norms of medically necessary and reasonable treatment protocols, take into account reasonable variations that may be caused by differences among physicians with respect to their medical practices and judgment, and in so doing single out those claims which represent departures from expected norms for closer inspection and review to determine whether services rendered or fees charged were in fact necessary and appropriate.

The initial stage of the claims review process is normally geared to verifying that the claim is for services covered under the insurance plan. Questions that are often asked at this stage include: Is there incompleteness, inconsistency, or duplication of entries (cf. surgery but no operating room or anaesthesia charges, or vice versa)? Are procedures performed and the pattern of care consistent with the diagnosis? Do charges appear excessive? Is the claim covered by workmen's compensation? Are the diagnosis and procedures performed consistent with those of non-covered services? Is the case a custodial care case? The issue of custodial care is a particularly difficult one, and deserves closer attention. In order to make a judgment on a potential custodial care case, claims review plans often call for a close study of the patient's medical record, including current length of stay, need for skilled services or constant attention, inpatient history (repeat admissions, previous long episodes of illness), utilization review committee decisions, physician's orders, nursing care plans, progress notes, and physician recertification statements. In short, claims review, to be effective, must be prepared to study a case in minute detail.

It is common for claims review plans to develop aggregate utilization norms and identify normal patterns of care from analysis of claims data on a regular, frequent basis. Continual updating of norms is essential, even if expensive, in order to keep up with changing methods and patterns of care. Individual physicians can then be compared to the aggregate norms and singled out, where appropriate, for closer observation or peer review. Kinds of norms typically found in claims review procedures are:

- Ratio of total services rendered to total beneficiaries
- Ratios of lab services, x-rays, physical therapy, and injections to total beneficiaries
- Ratios of office, home, hospital, nursing home, and ECF services to total beneficiaries
- Average total payments on assignment to physicians
- Average total payments to each physician
- Number of multiple visits or consultations for various diagnoses
- Normal spread of physician visits over time

Claims review plans also develop physician profiles. A typical physician profile includes:

- Total beneficiaries served in current quarter; year to date
- Number of services provided in current quarter; year to date

- Number of services provided by location (office, home, hospital, etc.)
- Number of services provided by type (visits, injections, lab, etc.)
- Charges per quarter; year to date
- Allowed charges per quarter; year to date
- Total payments on assignment
- Total payments to all beneficiaries
- Total allowed charges per service per location
- Total payments on assignment per service per location
- Total payments to beneficiaries per service per location
- Physician demographic statistics

When a physician is singled out for closer surveillance due to significant deviations from group norms, often a different type of profile is generated. Such a profile usually includes:

- Number of services to each beneficiary by type of service; current quarter and year to date
- Number of services to each beneficiary by location of service; current quarter and year to date
- Charges for each service
- Allowed charge for each service
- Total charges, all services, for each beneficiary
- Total allowed charges, all services, for each beneficiary
- Total payments for each beneficiary on assignment

While the above examples of profiles and utilization parameters have been given in terms of physicians, appropriate modifications render the concepts equally applicable to hospitals and patients.

The remainder of this section will be devoted to a discussion of various claims review models either in current use or in the developmental stage, followed by a brief summary of the major attributes of the claims review models discussed.

### 1. The Basic Blue Cross Model

In a typical Blue Cross claims review system, claims are reviewed with respect to appropriateness of admission, length of stay, and services rendered. In some instances, efficiency of hospital scheduling is also considered (11). While some plans review admissions material from the hospital and make a provisional determination of eligibility before the patient's discharge, frequently the first step is submission of a completed hospital claims form. Whatever the case, completed claims are reviewed against utilization and fee norms and those falling outside the guidelines are sent to the next stage of review by either a trained clerk, nurse, or physician. Most Blue Cross plans use nurses at this stage of review; some use them exclusively. Actions that may be taken by the reviewer at this time include a request for more information from the hospital, personal on-site examination of the patient's medical record at the hospital, review of a copy of the medical record at the Blue Cross office, use of a physician questionnaire, and direct communication with the physician involved. If the reviewer cannot reach a decision after taking one of these five actions, the claim is sent to the Plan's medical directors or consultants, who may in turn refer the claim for committee review. Common committees used at this point in the process include the Blue Cross Board of Trustees, a county or state medical society committee, the hospital's utilization review committee, a Blue Cross utilization review committee, and a medical advisory committee. After the final committee decision, an appeals mechanism is normally available, if necessary.

### 2. The Basic Foundations for Medical Care Peer Review Model

The following series of steps is representative of the claims review process at a Foundation for Medical Care. Claims are reviewed initially by general clerks who check for accuracy, completeness, and eligibility. A review clerk then checks each claim against Foundation-developed guidelines to screen out those claims requiring further investigation. Approximately 15-20 percent of all claims require further investigation, and move on to the peer review process. Members of the Foundation are appointed as review physicians on a rotating basis. When a review physician receives a claim, he may approve it or ask for more information. If he cannot settle the claim, it is then sent to a formal Peer Review Committee (less than 2 percent of all claims go to this Committee). If further discretionary action is required, the claim is then sent to the County or State Medical Society Grievance Committee for final decision. The appeals mechanism usually follows these five steps: (1) Re-review by the Peer Review Committee; (2) Foundation Board of Trustees; (3) County Medical Society; (4) State Medical Association; (5) The judicial process.

### 3. The San Diego Foundation Model

For this model of claims review, San Diego area physicians have developed community norms and patterns of care to judge the propriety of claims. Clerical review of all claims against the established criteria is the first step in the process, with selection for further review of those claims not meeting the guidelines. A physician reviewer sees the claims in his own specialty that were selected by the above process, and may take a number of actions, including approval, reduction of fee, request for additional information, reduction of the total claim due to identification of an unnecessary service, and referral of the claim to team review or major review. Team review is accomplished by one of five teams composed of ten physicians each that meet on a rotating basis to review complex claims involving total billing patterns. Major review is performed by a single committee and is responsible for review of cases of serious overutilization or constant deviation from community patterns.

Physicians in this system of claims review begin as medical reviewers, move up to team review, and eventually participate in major review. An additional feature of the San Diego model is its use as an educational tool by the practice of inviting physicians who exhibit questionable utilization practices to sit in on the claims review process.

### 4. The San Joaquin-Kern-Fresno Model

This is a model of claims review via local peer review, and is currently used in connection with Medicare Part B claims by the three named Foundations. Each foundation supplies its data to San Joaquin, where it is consolidated and re-distributed. Patient profiles are produced every two weeks and physician profiles every month, and are used in the claims review process for review of fees and utilization. The process is as follows: first, a reviewer checks claims against fee and utilization norms, and forwards all claims falling outside the guidelines for medical review. In addition, all claims involving certain diagnoses or certain physicians are also forwarded. In total, 33-60 percent of all claims are forwarded. The next step is review by a medical consultant, who makes a decision if possible or forwards the claim to a senior consultant. If the senior consultant still cannot resolve the claim, the next step is a medical committee composed of all the medical consultants, followed, if need be, by review at the County Medical Society Level.

While at San Joaquin and Kern, claims are submitted by providers on a daily basis, the Fresno foundation maintains a unique approach that warrants discussion. At Fresno, a physician taking Medicare claims on assignment may submit his claims only once per month. With this system, a single reviewer can see all the claims of a given physician at one time, making identification of abnormalities relatively simple. Fresno's self-assessment of the program is that it is extremely effective and eliminates the need for case by case review of patient and physician profiles. Since assignments represent 80 percent of all Medicare claims, savings achieved by this approach may be very significant.

The results of this claims review model have been extremely encouraging: 20 percent savings in the first year of operation, and 14 percent in the second year. Of this 14 percent, it is interesting to note that 12 percent of it is attributed to utilization savings and only 2 percent to fee review.

### 5. The Hennepin County Foundation for Health Care Evaluation Model

This foundation-based model differs from the San Joaquin model in terms of its usage of minimum standards, relationship with the insurance industry, and peer review. Insurance carriers underwrite the administrative overhead of the Foundation and are responsible for initial review and screening of claims. During this initial screening, the insurance carriers are required to use UCR fee guidelines and criteria of care parameters developed by the Foundation. The UCR fee guidelines are developed from fee profiles of participating physicians and use the 84 percent cut-off level; a level chosen so that the Foundation can review enough claims to be considered effective without overburdening itself. The criteria of care, developed by physicians representing 22 major surgical and medical specialties, are contained in the Book of Medical Care Norms and cover over 220 inpatient and outpatient conditions. Review of a claim by the Foundation can be requested by the insurance carrier, the physician, or the patient, but most reviews are requested by the carrier.

The process of claims review is conducted in the following manner. Standard claims forms are sent from the provider to the appropriate insurance agency, where they are checked against the Foundation's medical and fee norms. If the claim conforms to the norms, it is paid; if not, it is sent to the Foundation for review with notification sent to the provider that the claim has been sent to the Foundation. The Foundation review process begins with directing the claim to one of two Foundation sections, the inpatient hospital section or the ambulatory care and fee section. Because the physician is not identified on the claims form, the review process treats members and non-members equally. The first step is review by an individual physician of the same specialty field that the claim represents. If additional medical information is needed, the reviewer obtains it. If the problem is only a matter of fee, the fee is reduced to the maximum guideline and paid. When the reviewer feels he cannot adequately settle the claim, the claim goes before the entire Peer Review Panel. The panel is composed of 21 physicians representing 21 specialties, meets once a week, and has a target case load of 20. At the Peer Review Panel meeting, cases are parcelled out to the appropriate specialist on the panel. The specialist then presents the case to the entire panel with the recommendations of the first physician reviewer and his own recommendations. The panel makes a final decision and notifies the carrier and the physician of the judgment.

Initial results of the Foundation's program are promising: for the nine month period June 1971 – March 1972, 57.4 percent of claims received were reduced, resulting in a substantial cost saving.

### 6. The Kansas Blue Cross-State Peer Review Model

This model of claims review services Kansas Blue Cross and Blue Shield, Medicare, Medicaid, and the federal program for dependents of servicemen (CHAMPUS). Historical data on claims and utilization are used to generate review norms. Claims are initially sent to the computer for review against the Plan's norms. All abnormal claims are then classified into one of two groups: fees or overutilization. The Classified claims are then sent to a review group composed of five physicians, which reviews the claim and attempts to adjudicate it by direct contact with the physician involved. If the claim is not settled in this manner, it is sent to one of four state peer review committees, which may approve, ask for further information, disallow in part or in total, or send the claim to one of eighteen local peer review groups. The latter action is taken most often when fraud or departure from community patterns is suspected. The local peer review committee, in turn, places special emphasis on identifying fraud or substantial deviation from community norms. If such a finding is made, the local peer review committee may resolve the case by direct contact with the physician, referral back to the state peer review committee, or appeal to the state Healing Arts Board for possible filing of charges for revocation of the physician's license. The appeals process follows three steps: (1) reconsideration by the state peer review committee; (2) referral to the Blue Shield Executive Committee for a decision; (3) referral to the Kansas Medical Society for a recommended solution (which is accepted by the Blue Shield Executive Committee by established precedent).

### 7. The Mississippi EMCRO Model

The review of hospital and physician care forms the basis for this model. Sixteen of the eighteen existing Mississippi subspecialty societies developed criteria for inpatient diagnoses to be used as a basis for selecting claims for closer review. These criteria included the circumstances indicating the need for hospital admission, the usual services provided, the services consistent (even if not usually provided) with each diagnosis, the expected length of stay without complications, and the conditions that may increase the length of stay beyond that expected. Data on cases to be reviewed is abstracted from the patient's medical record by the medical records librarian at each hospital and input to a computer which performs the comparison with the criteria discussed above. If deviations from the criteria are found, the computer first scans the data for input error. If none is found, the case is sent to a reviewing physician or the utilization review committee. While this model is currently used for utilization review rather than claims review, its applicability in supporting claims review is apparent. The uniqueness of the model lies in its use of data from medical records rather than claims forms.

### 8. The Mississippi Verification Model

Claims review in this model is performed with the unique approach of spot check verification of claims by site visits. Site visits to physicians involve a check of the physician's records for the patient's name and social security number, the date of the visit, the principal problem, and the diagnosis and treatment, against the claim filed. Hospital verification involves a check of medical records for completeness; the existence of a plan for post-hospital care; and, the existence of physician statements of need and recertification. Spot checks at nursing homes center on similar data in the medical record. In pharmacies, the existence of signed prescriptions and refill orders is ascertained. Although the Mississippi audit is not currently based on singling out questionable claims for site visit review, it can certainly be geared to that concept without much difficulty.

### 9. The New York Medicaid Surveillance and Enforcement System

Although this system employs a variety of aforementioned claims review methods, its use of patient re-examination as a claims review technique is of interest(106,107). In the course of treatment, certain patients are provided with physical aids, prosthetic devices, and other types of medical appliances. Such patients can be examined not only for purposes of verification of actual receipt of appliances listed on claims forms, but also for evaluation of appropriateness of care. The New York Medicaid program currently examines patients who have been treated by optometrists, podiatrists, dentists, and opthalmologists, and is considering examination of patients who have received hearing aids and artificial limbs.

The claims review process works in the following manner. All claims involving patients who fall in the above re-examination categories are grouped together, and random samples, sized to meet the re-examination capabilities of the program, are drawn with stratification by geographical location. Invitations to the patients are then sent out, asking for their cooperation in the review process. The patients are then examined by physicians in the appropriate field, who record and send their findings to supervisors who compare the original claims with them and reach a decision concerning provision and quality of claimed services. A third physician then renders a final judgment on the case, and modification of the claim is made if warranted. If patterns of modified claims for individual physicians arise, a complete investigation of the physician is made.

### 10. The California On-Going Claims Review Model (Medi-Cal Management System)

This system has been developed for the simple reason that optimal use of a review organization's time and talents can be made by having the review organization adjudicate only exception claims, rather than all claims. The State of California asked the California Foundations to develop medical criteria programs for the project, including criteria for usual treatment patterns, consistency of amounts and types of inpatient services, drugs, and ancillary services. In addition, the criteria were reviewed by various national medical associations before final approval.

Current plans call for the computer to perform both administrative and medical review of claims. As a first step, claims are sent to local input centers for entrance into the system. The computer first checks for errors in administrative coding and eligibility. If the claim is accurate, it moves to a medical review section for a similar check on medical coding, followed by actual medical review. For medical review, the claim is first checked against what is termed a Broad Screen to eliminate very simple claims involving visits not requiring comparison with the Model Treatment Patterns criteria. If a claim is eliminated in this manner, it is paid and the information is recorded for patient and provider profiles. If not, the claim is sent to the Program for Model Treatment Patterns for review. If the patient's treatment conforms to a model treatment pattern, it is paid and information for profiles is recorded. Should the claim not conform to a model pattern it is flagged for manual review and accompanied by statements issued by the computer regarding the reasons for rejection and by the patient's profile. The local peer review mechanism handles the remainder of the adjudication process.

While little mention is made of the patient and provider profiles in the above process, it is reasonable to conclude that in addition to the steps mentioned, checks against patient profiles are made for similar past experiences, and checks against physician profiles are made for fee determination, with appropriate actions taken as necessary. One of the strongest arguments for this system is its attempt to make inroads to the problem of underutilization with the Model Treatment Pattern Program.

### 11. The University of Alabama On-Line Medicaid Claims Processing Model

Currently in the developmental stage, this model hopes to use standard numeric keyboard card reader telephones as remote computer terminals (155). Providers will be able to enter Medicaid claims information at the point of care, bypassing a great deal of paperwork, and in addition, use the system for retrieval of information about patient eligibility and extent of coverage. Proposed capabilities of the system will include on-line acceptance of claims information from telephone equipment, on-line editing of input data for accuracy with an appropriate response mechanism, and on-line responses to inquiries regarding eligibility, days of coverage remaining, visits remaining, and other topics, from providers, fiscal intermediaries, and the Medicaid Information Office of Alabama.

### 12. The Blue Cross/Blue Shield Claims Linkage System

Blue Cross and Blue Shield are currently working on a combined claims administration system. Four difficulties must be overcome to make the venture a success. These are incompatibility of data bases, electronic data processing restrictions, contract differences, and time differences in submission of claims between physicians and hospitals. The rationale for the system, however, makes excellent sense in expressing a philosophy of claims review that may be quite forward-looking: that maximum efficiency and impact via claims review can only be achieved by integrating patient, physician, and hospital profiles to analyze the entire patient experience.

### 13. The Philadelphia Blue Cross Model

This model of claims review applies only to hospital billings and was instituted in 1971 to handle Medicare and FEHBPUS. Claims are tagged for review if length of stay is inconsistent with the diagnosis or services delivered, if length of stay exceeds a specified limit (somewhere between the 50th and 75th PAS percentiles), if hospitalization appears unnecessary, or if the claim fits other normal patterns of cases subject to review.

When a claim has been identified as requiring investigation, the utilization review committee of the institution to which the claim is connected is contacted and asked to review the case within 20 days. The patient's physician is asked to do the same. Both the physician and hospital utilization review committee must respond in writing, attaching appropriate sections of the patient's medical record with justification for treatment. When the responses have been received, they are forwarded along with the claim for review by Blue Cross physicians.

Results of the program have been encouraging: Medicare investigation and rejection rates have doubled, from 0.8 percent to 1.6 percent. While hospital utilization review committees have been able to fully agree with Blue Cross in over 33 percent of claims being investigated, they have voiced the objection that an additional, though not undue, burden has been placed upon them. One possible modification of this model that has been suggested would be to include the summary sheet from the patient's medical record at the time the claim is submitted. This modification might, in some cases, save the entire investigative process and delay in settlement that currently exists.

### 14. Tulsa Blue Cross — Hospital Utilization Review Committee Model

This model of claims review combines prospective review with cooperation between Blue Cross and participating hospitals, and has had dramatic success since implementation (155). Under this program, each patient admitted to a participating hospital is assigned a certain number of pre-approved days of stay (PAD) based on the PAS Regional 75th percentile. Two days before the patient PAD is reached, the patient's physician must request certification for continued stay in writing. The request for certification must be reviewed immediately by at least one member of the hospital utilization review committee; if approved, certification is given up to a maximum of the 90th PAS percentile. The same procedure may be repeated again, with the 95th PAS percentile as a maximum. If the patient's stay is to exceed the 95th percentile, the entire hospital utilization review committee must review the case.

The focus of this project has been on cost and reduction of inappropriate utilization of hospital resources. In the first year of the project, average length of stay dropped more than four days in each of the two participating hospitals, representing percentage reductions in the neighborhood of 30 percent.

### 15. The Rhode Island Blue Cross — Hospital Utilization Review Committee Cooperative Model

A three-tiered process forms the basis for this claims review model. At level one, claims are divided into surgical/non-surgical categories and reviewed against internally established standards and norms. If a claim is flagged for further review at level one, it is automatically returned to the hospital for additional information, after which level two review occurs. Level two review is based on a patient's previous claims experience as well as the current claim in question. If satisfactory settlement of the claim cannot occur at level two, level three review commences. In this stage of review, the Blue Cross Medical Director and the hospital utilization review committee work separately in evaluating the case. Although the Blue Cross Medical Director is responsible for the final decision, the evaluation of the hospital utilization review committee is given appropriate consideration.

## 16. The Blue Cross Medical Advisory Committee – Hospital Utilization Review Committee Cooperative Model

This model has set up criteria for the claims review process itself. These criteria include:

(a) Use of input data from standard claims forms or abstracts of medical records

(b) Regionally established norms, standards, and parameters

(c) Professional review of claims selected for review

(d) Appeal mechanism

(e) Claims with two or more certifications to go directly to upper level review.

While the first four criteria have been implicitly included in many of the claims review models already discussed, the last criterion has not been heretofore mentioned, and suggests that in certain circumstances, the formal steps toward an ultimate decision ought to be circumvented to speed the claims processing function.

## 17. The Kansas Blue Cross – Hospital Utilization Review Committee Model (Topeka Cooperative Plan)

The Topeka Cooperative Plan has set up guidelines for cooperative models of claims review such as are discussed in this paper. These guidelines are listed below.

(a) Criteria, norms, patterns of care, and parameters of review should be mutually acceptable.

(b) A review of each extension beyond the initial precertified length of stay should be performed as soon as possible. If an adverse recertification decision is reached, appropriate advance notice should be given so that recertification will be denied.

(c) Monthly reports should be submitted to the third party by the hospital utilization review committee, including individual reports on each case involving a denial of recertification. If the patient decides to stay in the hospital past the approved length of stay even though recertification has been denied, the patient should be informed that he will be personally responsible for payment for the additional hospital care, and the hospital should show any charges for the additional time period as non-covered charges.

(d) An appropriate alternative level of care should be noted on all denials.

(e) Site visits should be made by the third party for liaison and communication purposes, including meetings with the utilization review committee.

(f) Review of claims approved by the hospital utilization review committee should be made independently by professionals employed by the third party, in order to ascertain the effectiveness of the cooperative model's reliance on the utilization review committee.

In summary, a number of advantages accrue to both the third party and the hospital from the use of a cooperative claims review model. These advantages include a centralized place of review for each hospital instead of a central third party committee for all hospitals; involvement of many physicians in the claims review process; ability to review more cases; emphasis placed on effective use of hospital resources, not just individual claims resolution; and a two-way flow of information and guidance. It is hoped that an increase in productivity and hospital efficiency will be the end result of the use of a cooperative model of claims review.

### 18. The Sacramento Foundation Certified Hospital Admission Program (CHAP) Model

CHAP incorporates prospective review into the claims review function where a physician must submit an application for certification of hospital admission to the Program together with information concerning the patient's current medical condition (19). A CHAP reviewer, either a nurse coordinator or an M.D. Certification Consultant, reviews the application and if appropriate, certifies an approved length of stay PAS (50th percentile) for the admission diagnosis. After admission , a Nurse Coordinator concurrently confirms the diagnosis, follows the patient's progress, and attempts to identify changes in the patient's condition that might require a change in the certified length of stay. If an extension of the approved length of stay is needed, it must be requested by the patient's physician and approved by a CHAP physician reviewer. After the patient is discharged, a claim is submitted with a CHAP certification form attached. The claim is paid without further delay if accompanied by a CHAP approved form. A variation of this last step is found in a program similar to CHAP, the AID (Approval by

Individual Diagnosis) Program in New Jersey (66), where final payment of the claim is not made routinely, but depends instead on whether the discharge diagnosis and the admitting diagnosis are identical.

At the time when CHAP was first implemented, the last step did not occur without insurance carrier verification of the CHAP decision. Now, however, the carriers involved have seen satisfactory evidence of CHAP's ability to perform the review process, with the result that they have eliminated their own audit of CHAP's decisions. A similar process of carrier verification ought to be expected when implementing programs similar to CHAP in other parts of the country.

Under CHAP, no restrictions are placed on choice of providers due to CHAP's widespread support by the medical profession and insurance carriers in the Sacramento area. Moreover, its twin policies of aiming at discharge prior to the certified length of stay and denying original certification unless medically necessary, can be shown to have achieved excellent results. Under CHAP's commercial insurance program a 27.1 percent reduction in hospital days has been observed, and under its Medi-Cal program, a 25 percent reduction in average length of stay. Finally, CHAP claims are expedited significantly, leading to rapid reimbursement to providers.

### 19. The New Mexico Foundation for Medical Care Model

This model of claims review combines, on a statewide basis, procedures for claims review similar to those developed at the San Joaquin Foundation for Medical Care with a precertification program similar to CHAP administered by the New Mexico Foundation. In addition, the New Mexico Foundation is developing criteria for four different levels of nursing home care to be used in a program of prospective nursing home review. Use of the model is currently limited to Medicaid claims. The criteria that form the basis of the review were formulated by panels of local physicians, and are used in connection with hospital services, physician services, and drugs.

For hospital services, prospective review of elective admissions and concurrent review of emergency admissions is conducted using the Hospital Admission Precertification Program (HAPP). Physicians request initial certification by sending an application to the Foundation. If the request is within the guidelines of the Foundation, and is justified by the patient's medical history, a length of stay (PAS 50th percentile) is certified. If not, the request is sent to a HAPP reviewing physician who may approve, disapprove, ask for more information, refer the request to a specialist, adjust the request, or refer it to the full HAPP Review Committee.

If the patient needs to remain in the hospital longer than the initial authorized length of stay, recertification is carried out by the utilization review committee of the hospital in question, a feature that distinguishes this program from CHAP. If the utilization review committee approves the request for extension, the approved length of stay is extended to the 75th PAS percentile and the Foundation is notified. The same procedure must be followed for all further extensions. While the hospital utilization review committee has the initial say on matters of extension, the Foundation monitors their decisions and has the final authority to approve or disapprove extensions.

An appeal mechanism is available if a hospital, physician, or patient wishes to appeal a HAPP decision. The appeal steps are as follows: (1) Re-review; (2) full HAPP committee; (3) Foundation Board of Directors; (4) New Mexico Professional Association Council; (5) HSSD Medicaid division; (6) HSSD Board of Directors; and (7) the courts.

For physician services, guidelines for initial claim processing have been established for approximately 170 diagnoses. The claim is first reviewed manually against the guidelines by properly trained and reliable claims processors. (Computerization of this process is seen in the near future when the criteria and data processing equipment become more sophisticated.) If the claim is questioned, it is sent to a review physician, who may approve the claim, reject it, or refer it to a Professional Review Committee. It is hoped that 10–20 percent of all physician claims will be reviewed for exceptions with less than one percent being referred to the Professional Review Committee. Claims processing for drugs is entirely automated.

Because data processing equipment is used quite extensively in this claims review process, the way in which it interfaces with claims reviewers and physicians is of interest. When claims are received, they are first microfilmed, then sent to clerical reviewers. Drug claims are inspected for accuracy, and a physician identification number is added. Hospital and physician claims are inspected for accuracy and adherence to guidelines, and appropriate service codes are added. The data is then entered into the computer system, which features an on-line payments system and CRT equipment for computer-reviewer communication. The computer checks patient and provider eligibility, duplication of claims, and verifies coverage for services claimed. If a claim is rejected for accuracy reasons, it is sent to an audit group for manual correction of errors. If not, the claim is priced, and paid if accepted. If initial review indicates that a claim should be reviewed by a physician, the physician examiner reviews the claim in conjunction with CRT display of patient and provider profiles, and can then instruct the computer to pay, adjust, reject, or designate the claim for full committee review.

All orders to pay claims are stored in the computer's memory, and on payment date are retrieved, sorted by provider, and paid. Claims designated for further review are sorted by specialty.

Preliminary results of this program indicate a cost savings of 10–20 percent for the New Mexico Medicaid program. The savings have been used to reinstate benefit provisions removed earlier, and have served as evidence to physicians of the efficiency of the Medicaid program, thus increasing physician participation in the program.

## 20. The Colorado Model

This model of prospective claims review for Medicaid, named the Colorado Hospital Admission Program, is quite similar to the Sacramento CHAP model. When physicians request the admission of their patients, the hospital normally admits the patient and determines an expected length of stay based on PAS statistics adjusted for age and diagnosis (multiple or single, medical or surgical). At this time, a form is sent to the involved third party for verification of the allotted length of stay. If an extension is needed, it must be requested by the physician, approved by the hospital utilization review committee (at least one member), and approved by the state. State approval is normally given by a phone call followed by a written confirmation. In addition, extensions must be sought and granted before the end of the first approved length of stay. If they are not, no payment is made for any days of stay incurred while waiting for a late recertification.

Appeals procedures are available if either the hospital utilization review committee or the state refuse to recertify. If the hospital refuses and the physician agrees but the patient wishes to stay, the problem is handed over to the department of public welfare. If the physician disagrees, the case is brought to the Regional Review Committee and proceeds through the state review mechanism. If the state refuses to recertify, appeal is made to the State Peer Review Committee, whose decision is binding.

The model has not been without problems, as might be expected. Physicians are unhappy with the paperwork involved, and resent the state questioning their judgment. In addition, problems with PAS statistics have led to the prospect of developing standards exclusively for Colorado. Nevertheless, there are demonstrable savings for fiscal year 1971. Moreover, two important criteria for any claims review model have come out of the Colorado experience. These are continual evaluation of standards selected, and involvement of all concerned groups starting in the planning stage of development.

### 21. The Illinois Hospital Admission and Surveillance Program

The Illinois model, named HASP, is a prospective review mechanism similar to the Colorado model, but with state, regional, and local HASP committees. While most decisions are arrived at in local committee meetings, regional monitoring exists due to the assertion that peer review on a local level may sometimes be influenced by personal relationships. Illinois hopes to bring objectivity to the process of claims review with the State-regional-local committee structure.

### 22. Drug Claims Review: General Comments

The problems with claims review for drugs are manifold, revolving around the high number of units administered, the low unit costs, and the expense of data gathering. It is commonly asserted, in fact, that the costs per claim would exceed the benefits of drug claims review as a cost control mechanism. Current data processing systems nevertheless offer the capability of producing a variety of useful drug claims information, including expenditures for individual patients over given time periods, expenditures for individual drugs and drug categories over given time periods, benefits paid to individual pharmacies, patterns of physician prescribing, and most other categories readily obtainable from data manipulation. A rather unique use of these capabilities is discussed in the following section.

### 23. The San Joaquin Drug Claims Model

This model is somewhat unusual due to its emphasis on selecting patients rather than claims for the review process. Drug claims are entered into the entirely computerized system, from which patient and provider profiles are developed. The computer then selects patients for review if inspection of the patient profile reveals that the patient meets any one of a number of criteria. These criteria include:

(a) Patient receives more than a certain number of prescriptions in a certain time period

(b) Patient receives more than a certain number of prescriptions in a therapeutic category in a certain time period

(c) Patient receives more than a certain dollar value of prescriptions in a certain time period

(d) Patient visits more than a specified number of physicians in a certain time period

(e) Patient receives prescriptions from more than a specified number of pharmacies in a given time period

(f) Patient receives similar drugs in the same therapeutic category on the same day at more than one pharmacy.

All profiles of patients so selected are reviewed by the Drug Utilization Review Committee on a regular basis. While application of the system is currently limited to patient profiles, a similar selection process with appropriate criteria is also feasible using provider and pharmacy profiles.

Summary Comments

This section will summarize the major attributes of the claims review models discussed in this paper; an attribute will be listed even if it applies to only one or two models, though most attributes listed will apply to a number of different models.

1. Review of hospital utilization and services, physician services, and drug utilization, for individual episodes of illness.

2. Overall review of physician and patient profiles without reference to individual claims.

3. Retrospective review.

4. Criteria for selection of claims for further review include utilization norms, model patterns of care, certain diagnoses, certain physicians.

5. Norms and review guidelines developed by local or regional panels of physicians, reflecting local and regional practices.

6. Use of regional length of stay norms developed by PAS.

7. Continual evaluation and revision of norms and guidelines.

8. Three to five levels of review.

9. Initial review conducted by clerical personnel.

10. Manual initial review.

11. Initial review by computer.

12. Initial review designed to identify 10–20 percent of claims for further review.

13. Second and subsequent levels of review conducted by nurses or physicians, usually physicians.

14. Use of on-line EDP at second level of review.

15. Committees of physicians for upper levels of review.

16. Rotating physician teams for upper levels of review.

17. Local, regional, and state peer review committees for upper levels of review. Order of claims flow not necessarily local to regional to state.

18. Classification of claims by specialty for review by physicians at upper levels.

19. Cooperation between hospital utilization review committee and upper level reviewers.

20. Less than 2-percent of claims to reach upper level review.

21. Availability of appeals mechanism.

22. Analysis of entire patient experience by integration of review of patient, physician, and hospital profiles and claims forms.

23. Data extracted from claims forms and medical records.

24. Data verification by site visitation.

25. On-line input of claims information by providers at place of business.

26. Verification of claims by re-examination of patients.

## IV. COST CONTROL VIA PUBLIC REGULATION

### A. REVIEW OF INSTITUTIONAL PLANS

Cost control attempts generated within the traditional health care delivery system may ultimately prove ineffective for a great number of reasons, the most significant of which is non-optimal individualistic action within a system context. Such behavior is, of course, common to all systems in which the optimal course of action for the system differs from, or is in direct conflict with, the product of the optimal courses of action perceived by the individual components of the system. This problem is manifested most frequently in the health care system with respect to hospital growth and expansion, and the result has been a continuous movement toward public regulation of hospital construction with the Hill-Harris and Comprehensive Health Planning legislation.

Hospital expansion bears directly on the issue of rising health care costs. Expansion adds operating overhead, increases total expenditures, and may increase unit costs. Moreover, expansion may be in no one's interest if adequate personnel are unavailable, if it duplicates existing facilities for which demand cannot support a multiplicity of units, or if it results in competition with other institutions for current employees. On the other hand, it is difficult to deny the necessity for expansion when it legitimately adds to the supply of beds or services, or when it results in the replacement of worn or out-moded equipment. The problem arises from the fact that individual hospitals cannot be trusted to evaluate the needs of the community; it is very difficult for them to shed their individuality and act in an objective manner.

The Hospital Survey and Construction Act of 1946 (Hill-Harris) attempted to deal with this situation. The legislation contained three important systems – oriented principles, including the need for a survey of a community's needs before undertaking expansion, the sharing of professional services and facilities, and the establishment of area-wide coordinating/planning agencies to assist hospitals in developing cooperative relationships. The act provided that receipt of federal monies for hospital construction would be tied to community need as determined by state or local Hill-Harris planning agencies. As a result, the influence of Hill-Harris has been a positive one over the last two and a half decades, resulting in new facilities in priority areas, a closing of the gap in facilities between rural and urban areas, and the development of architectural, construction, and equipment standards. Its principal weakness is that it applies only to surveillance of hospitals that apply for federal construction grants, so that approximately 60 percent of hospital construction does *not* come under its jurisdiction.

Public Law 89-749, the Partnership for Health Act enacted in 1966, is the enabling legislation for Comprehensive Health Planning Agencies. With this legislation, the federal government recognized the nation's need for comprehensive health planning, not just planning of hospital construction. Stronger support must be given to CHP agencies, however, before they can begin to have a significant effect on the health care system via the planning process.

While the current impact of areawide planning on cost control in health care is limited, there do exist models of public regulation that will be able to exert a stronger influence on costs. One such model has been proposed by the Barr

Report. Every health institution would be required to prepare and submit an annual institutional plan to an area-wide planning agency which would be responsible for coordinating all plans, developing a master plan, and developing guidelines for determining the area's needs. A statewide agency would in turn review all area master plans and submit a statewide plan of action to be reviewed by federal authorities. Federal financing of statewide health facilities planning would be tied to federal acceptance of the statewide plan, so that control of construction would be essentially based on federal and state decision-making. The apparent assumption with this model is that if a health institution refused to follow the statewide plan and thus jeopardized a state's planning finances, the state would retaliate with appropriate sanctions or pressure on the institution to comply.

A less centralized model of cost control via public regulation involves third party reimbursement. Currently, third party reimbursement to hospitals includes provisions for capital costs, depreciation, and often a miscellaneous plus factor to provide replacement or expansion capabilities. Thus third party reimbursement plays a major role in providing funds for facility expansion. This role can be expounded by tieing the third parties to the planning process. Two possibilities are discussed below.

One idea is to lump together all funds that would have been reimbursed to all hospitals for capital costs, depreciation, and the plus factor, and set them aside for administration and distribution by the areawide planning body according to an approved expansion plan. This idea sees to it that the system as a whole is not deprived of expansion funds while at the same time allocating these funds in a more appropriate manner. The other idea is to link third parties with planning in a punitive way. For example, hospitals that expand without the approval of the planning authority could have their reimbursement reduced by the amount the expansion adds to the hospital's costs. Such a method of cost control is currently in use in New Jersey Blue Cross contracts. An alternative punitive measure might be cancellation of the Blue Cross contracts if the hospital expanded despite a planning agency veto. In any event, the insurance carrier-planning authority model of cost control appears to be a significant way of implementing the cost controlling abilities of areawide planning.

The idea of public regulation of hospital plans ultimately revolves around the fact that hospitals cannot be allowed to be institutions unto themselves. Actions that might be considered appropriate public regulatory actions include closing facilities, converting facilities to another type of use, requiring certain services to be shared, and coordinating services to reduce overlap. All of these types of actions control costs via system efficiency and delivery of the appropriate level of care; at the same time, they cannot be reached by hospitals acting unilaterally, nor should they be expected of hospitals acting as a group. The only answer may be some form of public regulation. It should be pointed out, however, that public regulation does not mean letting hospitals make errors and then pouncing on them when it is too late. Public regulation can also mean provision of technical assistance in any of a number of areas, including management, finance, manpower utilization, productivity, accounting, automation, etc. in an effort to help hospitals reach workable plans in a positive way. Regulation ought not to be an omniscient planning agency working in a communicative vacuum.

### B. INSURANCE RATE REGULATION

This method of cost control can best be used to force providers, third parties, and the public to think about cost control and perhaps implement stronger cost containment methods. Insurance rate regulation cannot succeed as a direct form of cost control, however, since if applied too strictly it must either result in the third parties' losing money or the reduction of benefit coverage for subscribers, either of which will be tolerated for very long. Its chief asset is publicity and subsequent actions taken and discussions held by providers, the public, and the insurance carriers. As an example of the catalytic ability of insurance rate regulation, one has only to look at the recent actions of the Insurance Commissioners in Pennsylvania and in Massachusetts.

## V. COST CONTROL VIA DELIVERY SYSTEM CHANGES

### A. GROUP PRACTICE PREPAYMENT PLANS

Despite the many cost control techniques available within today's health care delivery system, the fact of continually rising health care costs has prompted many people to call for changes in the delivery system itself in an effort to control costs (51, 78, 99, 127). The favorable cost and utilization experiences of group practice prepayment plans have forced the government and the public to look carefully at this method of health care delivery. Despite the fact that currently only six to seven percent of the population receive health care via prepaid group practice, many health professionals feel that this system may well be the wave of the future. Pending federal legislation supports the essentials of prepaid group practice in its definitions of Health Maintenance Organizations, and while it is true that an HMO may take several forms, the essence of prepaid group practice remains in all of these forms: delivery of a comprehensive range of inpatient and outpatient services financed on a capitation basis (single annual fee per patient regardless of utilization). By tieing the health care delivery system to the health care financing system by the capitation method of payment, significant changes from the present delivery system are made; physicians become involved in risk-bearing, and new motivations for responsible cost control arise. While costs may rise from year to year, the key point is that due to capitation, the prepaid plan must absorb all losses if costs are higher than planned, and can share the savings with physician members if payments exceed costs. The physician is thus under continual pressure to evaluate the appropriateness of the medical care he delivers. In addition, due to the group nature of the group practice plan, there are many build-in cost savings due to centralization of facilities, administration, EDP, medical records, laboratories, accounting, ancillary personnel, etc.

Empirical evidence based on the past experiences of group practice pre-payment plans is the best testimony to their cost control effectiveness. As previously discussed, control of utilization of health services is perhaps the fundamental key to cost control. In this regard, group practice pre-payment plans have shown significant savings in inpatient hospital utilization and surgery. While many studies have shown the marked differences in all hospital utilization parameters between group practice pre-payment and the traditional delivery system, perhaps the most widely quoted is George Perrott's study of FEHBPUS in the early 1960's. In this study, Perrott showed that for federal employees enrolled in the available group practice pre-payment plan, hospital days per 1000 enrollees in 1961–1962 were 55.1 percent of the figure for employees enrolled in Blue Cross/Blue Shield and 64.3 percent of the figure for employees enrolled under indemnity plans, with even more favorable figures for the 1962–1963 period. Similar findings have been observed in the Kaiser plan in California and other group practices. As an example of what this means in terms of costs, it is estimated that at Kaiser, consumer input in dollars is 65–80 percent of what it would be for comparable services in a traditional fee-for-service setting (97). Government interest in group practice pre-payment, while not motivated on the basis of cost control alone, is certainly justified on this basis.

## B. FOUNDATIONS FOR MEDICAL CARE

While references to the Foundations for Medical Care have been in the claims review section of this paper, their peer/claims review function is not the only function they may serve (146). The Foundations have recently begun to experiment with *delivery* of health services on a contractual, capitation basis (36). The San Joaquin Foundation-Medicaid program is an excellent example of this model of health care delivery. The Foundation has contracted with the state to serve Medicaid patients on a capitation basis, with physicians being reimbursed on a fee-for-service basis. The Foundation receives an annual fee for each Medicaid patient, and is responsible for distributing the funds to Foundation physicians who render services to these patients. The Foundation has assumed risk in this model, since services must be delivered under the contract even if funds have expired; thus the essence of an HMO is found here even though fee-for-service reimbursement is used.

The experience of this model over the first three years of operation is quite enlightening. In the first year, the physicians were paid the usual, customary, and reasonable fees for their services (more than other California Medicaid physicians were receiving) and returned the excess of receipts over disbursements to the state at the end of the fiscal year. In the second year, funds ran out in the last month and fees over the last month were pro-rated as a result. The third year showed a surplus of funds, which this time was kept by the Foundation to be used as a reserve against future losses.

One of the key problems of this model is the idea of fee-for-service reimbursement. Due to this method of reimbursement, physicians are given an incentive toward overutilization; the more services delivered, the more fees paid, and with a fixed total sum to be paid out, competition for the available funds dictates over-delivery of services. Where the Foundations have a unique solution to this problem is in their peer review mechanism. If they can enforce appropriate standards of over- and under-utilization, then competition for the capitation funds can be eliminated, and the model may work well.

Conclusions that this type of HMO model using fee-for-service reimbursement is a viable one should not be drawn hastily. The real savings in the prepaid group practice HMO model are in control over hospital utilization. If the Foundation model can incorporate pre-payment for hospital care and successfully apply CHAP (which has begun to show utilization figures comparable to Kaiser) to reduce hospital utilization, then the substantial differences between the two models as cost control mechanisms are rather small. As long as the incentive and ability to control hospital utilization is present, the Foundation model can work well. If not, then the Foundation model is a poor second as a cost control mechanism.

# QUALITY OF CARE ASSESSMENT

by Suzanne H. Kase, R.N.

## INTRODUCTION

Donabedian (48) divides quality of care appraisal methods into two major classifications; (1) appraisal of process and (2) appraisal of outcome. Included in the subdivision of process appraisal methodology are (1) case review and (2) data used for clinical decision-making. In this sense, process appraisal refers to the evaluation of the activities of physicians and other health professionals in the management of patients.

Process appraisal may be defined as that which a provider does to a patient which is then observed/measured against some yardstick which leads to a decision of good or bad and if bad, allows alternative courses of action to correct the "badness." The underlying assumption is that the criteria are used to imply quality and are based upon previously established and accepted standards or norms.

Given that evaluation of process is the basis for judgment concerning quality, there is a major assumption that health care is useful in maintaining or promoting health. Furthermore, there is an assumption that particular elements and aspects of care are known to be physically related to successful or unsuccessful health outcomes or end results.

DeGeyndt (40) further delineates quality of care evaluation into two areas:

- *Assessment of content* answers the basic question of how medical care is practiced or of the content of clinical performance. Most quality of care studies have focused on the content of care.

- *Assessment of process* emphasizes the technical aspects of quality of care. In addition, it addresses the concept of the "whole patient", evaluating not only the work of the physician, but also the contributions of other health workers. Total management of the patient encompasses the prevention of illness, the arrest of pathological processes and physical rehabilitation. Patterns of referral and consultation with other health professionals are taken into consideration and are comprehensive in nature, i.e., more complete and continuous, and less episodic and fragmented. The development of measurement instruments to express the interrelationships between the dynamic elements of the care process and the interactions of the participants, represents a major difficulty. An important assumption underlying the rationale of this approach is that coordination of team work and a logical sequence of various elements in the care process will result in improved health status of the recipients.

## DEFINITION OF QUALITY OF CARE

A number of authors, such as Payne (142), Esselstyne in Donabedian (48), and Lee and Jones (112), have addressed the problem of defining quality of care. These definitions encompass a spectrum of ideas from the technical aspects of practice (142), documentation (48,142), outcome concerns (142), physician-patient relationships (112), range of services (112), and accessibility and availability (48,112).

Donabedian (48) states that "quality of medical care is extraordinarily difficult to define since one must first indicate what dimensions or aspects of care are subject to consideration and then specify what constitutes 'goodness' or 'badness' with respect to these aspects or dimensions."

Payne's (142) definition includes process and outcome relationships. He states "quality is that level of excellence produced and documented in the process of diagnosis and therapy, based on the best knowledge derived from science and the humanities which eventuates in the least morbidity and mortality among the population." Esselstyne (48) directs attention toward standards of quality which include availability of care as well as documentation and the extent to which adequate therapy is based on accurate diagnosis. In defining quality of care, Lee and Jones have expanded their definition to include "the manner in which the total capabilities of the medical care system are deployed in the interests of all the people."

DeGuyndt (40) defines quality as the degree of conformity with preset standards and deals almost exclusively with patient care as contrasted to medical care and health care. Assessment of the content of clinical performance depends upon the development of standards which in turn depends upon professional judgment and consensus on the nature of good care. He further states that to define quality is to limit its meaning, that the definition reflects the value judgment on the part of its author and that the definition implicitly advocates the criteria to be used in quality of care.

Weed (199) states that quality control can be thought of on two levels of sophistication. One level attempts to identify glaring errors while the other reflects, unequivocally, the understanding that quality is the excellence with which a well defined function is fulfilled.

Weed further believes that evaluation of quality is based on:

(1) Agreement, before hand, on a data base and how it should be recorded.

(2) Agreement, before hand, as to what care patients should receive.

(3) Careful formulation of problems.

(4) Unambiguous data as to what was done for each problem.

(5) How each problem was solved.

## AUDIT

Donabedian (48) states that case review is a detailed examination of professional performance for appraisal of quality and the use of service and is the most definitive of all methods of assessment. These reviews or audits may be described as:

- *External audit* carried out by one or more examiners who are independent of the hospital or other setting in which the care is delivered, and

- *Internal audit* conducted by one or more committees of the medical staff in the setting in which the care is delivered.

Ferrier (64) in "Appraising and Improving the Quality of Medical Care in Ambulatory Group Practice" reports experience with internal and external audits. Two of the external audits focused primarily on attempting to measure the extent to which the programs of the clinic approached the ideal model of comprehensive prepayment group practice. The third external audit compared the types and volume of services in three clinics with the performances of the outpatient teaching facility of the University of Pittsburgh School of Medicine. It was found that external audits stimulated the performance of internal audits in all the clinics.

An extensive internal audit was carried out in one clinic utilizing worksheets constructed to address not only the technological dimensions of care, but also the important elements of continuity and coordination. The primary purpose of this audit was to provide a critical appraisal of the quality of medical services provided by the medical group and was directed to an elucidation of problems and weaknesses common to the group rather than to an estimation of the errors of an individual physician.

## STANDARDS AND CRITERIA

The development of standards and/or criteria for comparison of actual practice with desirable practice remains the focal point for issues of process assessment.

Donabedian (48) states that standards are the essential ingredient of any system of measurement or appraisal. He addresses the following nine aspects of standards:

- *Source* – standards may be derived from two sources:

    1) Those based upon expert opinion, notions, or pronouncements of what is good (normative standards). These may be formulated by recognized leaders in their respective specialties, expert panels from medical schools, research staffs, qualified practitioners, textbooks and standard publications. However, he points out that these standards also may be set by lesser experts or by those values held generally by the rank-and-file of medical practice.

    2) *Empirical standards* – are derived from actual practice patterns of physicians including those associated with outstanding teaching hospitals and medical schools. Usually, these standards are derived from practice in the general community.

- *Validity* – validation of standards is ultimately derived from their demonstrated relationships to valued outcomes. Comparative studies of actual practice provide tests of validity, e.g. changes in length of stay, when based on observations that length of stay in some hospitals has been reduced without apparent adverse effect on the patient.

- *Consensus* – a certain degree of agreement among recognized leaders in the profession is necessary to permit convincing evaluation. In some instances, if consensus cannot be reached two standards may have to be developed, e.g. the question of indications for tonsillectomy.

- *Stability* – standards, especially those that are normatively derived, need to be constantly reformulated as medical science and technology change.

- *Transferability* – this refers to the applicability of standards to all groups and settings. This is pertinent in relationship to standards set for general practice and those for specialists in academic settings. Some feel that normative standards for good practice, if they represent what current medical science can achieve, should be of general applicability. Different characteristics may be found in various localities. As an example, the availability and provisions for alternatives to hospitalization may influence length of stay standards, e.g. presence or absence of home care services.

- *Configuration* – there are two characteristics to which this aspect applies. *Monotonic* establishes the degree of attainment of the goal under the best conditions of care. This is described as "the more, the better" or "the less, the better". For example, it may be that 100 percent of cases of diagnosed myocardial infarction should have had an electrocardiogram in the process of investigation.

- *Inflected* – configuration refers to an optimum range or value in which the quality decreases above or below. Donabedian cites an example from Slee who suggests that the optimal range for a pathologically positive tissue in primary appendectomy may be 80 percent to 90 percent. A percentage lower may mean too great a readiness to operate; a higher percentage may mean excessive conservatism and the possibility that the inflamed appendices are allowed to go untreated. Inflected configuration should be determined empirically and cannot be stated *a priori*

- *Level of stringency* – Normative and empirical standards can be set at various levels. Levels of stringency should be set to allow the ability to discriminate while at the same time not setting standards so high that no practice in real life can meet it. A second consideration is the yield of the standard or the volume of aberrant cases identified in relationship to the effort expended in reviewing the cases.

- *Content* – it becomes important to examine what dimensions of care will be used to determine the quality of the care. *Polydimensional* refers to those in which a broad number of dimensions of care are examined. These may include the records, the diagnostic management, and the treatment and follow-up; each of these sections having four or five parts. *Oligodimensional* studies are those in which two or three items are chosen to represent the complex concept of quality. Donabedian (48) refers to the studies of Peterson and Barsamian (148, 150) which concentrate on two basic dimensions: justification of diagnosis and therapy. Most of the studies which have been examined are those which have developed criteria relevant to the traditionally defined dimensions of technical management. Seldom included in the content of studies are those aspects which deal with preventive, rehabilitative, social, and psychological management. One of the factors which influences the completeness of content assessment is dependent upon the extent of homogeneity within the practice of the physician or institution. It may be that the more homogeneous the practice, only a few aspects of care may need to be examined to give a reasonably good picture of the quality of care.

Donabedian (48) pays particular attention to the relationship of the number and nature of dimensions represented in the standards to the ability of the standard to discriminate among levels of care. Morehead (128) describes this problem in that a patient may have had good or excellent care in relationship to the technical portion of his care whereas another patient may have had not only that, but also attention to some of his social, psychological, etc. needs. This indicates that there may be a hierarchical order in physician performance with respect to the many dimensions of care.

It is important, therefore, to identify what dimensions are included in the evaluational system and to judge whether they cover the range of dimensions believed necessary to obtain a well-rounded view of quality.

- *Explicitness* – Donabedian (48) states that specification of criteria indicates the degree to which the standards and procedures for evaluation have been formalized. *Implicit criteria* – indicate that the examiner is the expert, and that he compares and judges the management of the case as though it were his own. *Explicit criteria* – is characterized by prior, explicit and formal specification of criteria and procedures to be used in the evaluation. Professional judgment is used, but limited by instruction as to what aspects are to be considered.

deRouville's (45) study of peer review in biliary tract surgery concluded that a review mechanism which relies on pure peer judgment by multiple assessors is not a satisfactory tool for measuring the quality of medical care within a large population of cases. This is apart from the obvious disadvantages of excessive costs, expenditure of huge amounts of professional time, and lack of sufficient numbers of reviewers willing to participate. A comprehensive evaluation form was prepared for reviewer use, furnishing no criteria or standards. Reviewers were forced to rely entirely on their own judgment in rendering a final evaluation of the quality of care rendered. The reviewer was required to report two final judgments: 1) judgment on a five-point scale, from superior to totally unacceptable; and 2) judgment on a scale of only two categories; satisfactory and unsatisfactory. Changes in leniency were observed and documented by reviewers during the course of this study.

A second group of cases were reviewed in which an evaluation form was developed. It contained a number of built-in criteria for use with guidelines by the reviewer and included instructions for determining the level of quality and certain defined standards of clinical investigation. It required a large element of subjective judgment in reaching the final decision of satisfactory or unsatisfactory. The application of even the moderately flexible built-in criteria increased the frequency with which more stringent judgments were made.

Length-of-stay norms developed by PAS are an example of empiric criteria. Lengths of stay by diagnosis are reported both on national and regional bases and are representative of the current, on-going, practice. The use of these data in establishing criteria is demonstrated by the Experimental Medical Care Review Organization in Mississippi in which the PAS data were used in establishing LOS criteria for specific diagnoses. As data were collected and compared to actual practice in Mississippi, these length of stay criteria were modified to match the practice in the area.

Fessel (65) in a study assessing quality of care from medical records developed a methodology to determine the extent to which the quantity or quality of recorded data was related to the outcome of either acute appendicitis or myocardial infarction. In this study, both normative and empiric criteria were used. The empiric criteria listed 44 items which had been documented for 75 percent or more of the patients from 50 randomly selected patients with acute myocardial infarction. Further on in the study, Fessel's group requested three cardiologists to compile a traditional audit list for acute myocardial infarction; the cardiologists considered the items they listed to be minimal requirements for a good quality medical care of this disorder.

Schonfeld (179) undertook study to provide information that could be used in describing the content of good dental care and in developing standards that could be applied to clinical audits of dental practice. The dimensions defined were: the types of dental services that should be provided, the sequence in which they should be given, the factors that interfere with the provision and receipt of needed dental care, and the health consequences of not receiving the needed services. Emphasis in the study was in the methodology used to develop indices by which the content of good dental practice could be measured. Normative criteria were developed from the professional judgments of qualified dental practitioners with the view towards utilizing general dental practitioners as well as dental specialists in various locations to ultimately provide representation from various organizational patterns, e.g., solo private practice, partnerships, private and public group practice teams, etc.

> The standards being developed by the previous group of dentists were then submitted for review to the larger groups of dentists including dental school faculty members, public health and other medical personnel and representatives of organized consumer groups. The indices or dimensions of care developed through this approach extend to prevention, examination, treatment, and treatment planning for various categories of patients and conditions with dental problems. Many of the standards for these indices will be presented either for all people having the disease or condition or will be limited to a specified dentition, such as prior examination or treatment group. The information contained in the various sections of the completed interview schedules allows the data utilized to describe the content of good dental care. The opinions of several dentists interviewed on the same subject are being consolidated. When substantive agreement exists, the quantitative data are combined and expressed in the form of distribution of values and/or as summary statistics. If there is no substantial agreement among the respondents, more than one value is being prepared for the index.

Lembcke describes analysis as being objective or subjective in methodology and refers to case-by-case analyses with partly objective and partly subjective methods which have been conducted by a few independent medical auditors – Eisele, Rosenfeld, Trussel, Makover, etc. – on a small scale. The subjective method refers to the value judgments made by the reviewer by applying expert personal knowledge to the evaluation of individual cases. These findings can be expressed in objective terms such as the incidence of operations. A central issue is the need for objective criteria and for standards by which to measure compliance with the criteria. Lembcke (113) has described six cardinal points applicable to all criteria as follows:

- *Objectivity* – stated in writing with sufficient precision and detail to make them relatively immune to varying interpretations by different individuals.

- *Verifiability* – so framed so that points on which they rest could be verified by laboratory examination, consultation, or documentation.

- *Uniformity* – independent of such factors as size or location of hospital, qualification of the physician or social and economic status of patient.

- *Specificity* – specific for each kind of disease or operation to be evaluated and all significant and closely related diseases or operations in the same patient considered as a unit.

- *Pertinence* – pertinent to the ultimate aim of the medical care being evaluated and based on results rather than intention.

- *Acceptability* – conform with generally accepted levels of good quality as set forth in leading textbooks and articles based on scientific study.

Criteria then need to be tested on sufficient numbers of cases to assure that the data to which they apply are available in most instances. Feasibility of compliance by the medical staff is another major source of concern. Validation of the criteria can ultimately be accomplished by correlation with outcome studies.

Standards refer to the degree or percentage of compliance with criteria which can be calculated for each hospital and each physician. Since perfection is seldom attainable in medical practice or in the framing of criteria, allowance must be made systematically and objectively to accommodate the inexactness of criteria and the exercise of clinical judgment. Lembcke further states that really valuable definitions and criteria can be developed only, if after being formulated, they are published and thus subjected to criticism and improvement by others.

In criteria formulation, emphasis should fall on the key elements of technical management that can usually be identified as present or absent by the review of the records. The more general and non-directive the standards are, the more one must depend upon the interpretation and implicit norms of the person who is doing the actual assessment of care. If criteria are developed in staff participation as advocated by Payne, it insures acceptability of the criteria and the whole system of quality supervision. This can be an important part of education, communication, and change in behavior. With increased specificity of criteria abstracting, the process of evaluation can be expedited and with still greater specification of criteria the entire task can be turned over to a computer.

## SOURCES OF INFORMATION

In attempting to describe various parts of the review process, it is useful to describe the sources of information or data base as follows:

- *Direct observation* – of a clinical situation by a confident observer is a method well documented by a classic study done by Peterson (151) of North Carolina General Practitioners. In this work, direct observation of the physicians in actual practice was made. The variation and quality of the physician's performance were related, among others, to performance and medical school length of internship and residency training and age.

  Hinz (87) utilizes the observations of actual performance of senior medical students in an ambulatory clerkship to describe performance of clinical skill. Two areas of study were designed; one to document the interactions and communication of the medical student toward the patient and one to rate the content of information extracted from the patient by the student. Of particular concern in the study was student performance in history-taking and physical examination. Normative criteria were developed by a group of internists (on the faculty). Under "content of present illness," various types of information were listed and the observer rated how completely these items were addressed by the student. Various items were listed under "technique of eliciting history" and the student was adjudged as to whether these were or were not done, and whether they were appropriate or inappropriate. "Routine history" was itemized as well as the degree to which these were completely addressed by the student, as were "physical examination" and "presentation of the case." Items on the list were tested for pertinance to all or at least most patient examinations and for observability. Training of the observers had to be done due to inter-rater variation in scoring. In addition, a great deal of professional time was required with its subsequent increase costs.

- *Interview method* – a second way of achieving an information base for attitude/opinion surveys is the interview method. The Brook and Stevenson (22) study on effectiveness of patient care in the emergency room used patient opinion surveys to determine the nature of communication between the physician and patient. Although the study is better known for its approach to assessing quality of care by process and outcome, one portion of this study utilized information gained from the patient via the interview technique and was used in reference to the outcome assessment portion of the study. The patients in this study were those selected by presentation to the emergency room with non-emergency gastro-intestinal symptoms and referred to the X-ray Department for further gastro-intestinal evaluation. Normative criteria were established for an adequate workup. Criteria selected were: completion of x-ray studies on the patient, production of an x-ray film of adequate quality to eliminate treatable lesions and proctoscopy on all patients who received a barium enema x-ray examination. Each patient was contacted by personal contact or telephone subsequent to their interaction with the emergency room to determine the followup for appropriate therapy.

The difficulty of the observation and interview methods of data collection lie with the excessive cost of providing observer/recorders; whether they be professionals or non-professionals as well as the cumbersome management of data; complexity of the process; and subsequent problems with bias, validity, and reliability. However, data collection for examining the dynamics of an interactive process seem to rest on observer-recorder methodology.

- *Clinical records* – the third and most widely used method of developing a data base is the utilization of data abstracted from medical records, with or without subsequent coding of these data for further use by the reviewer. This provides tangible evidence in an accessible form of the kinds of care given. These documents also provide the source material for most studies of the medical care process and are the basis for case review and for assistance of statistical display and analysis. Records of this type have been restricted to the assessment of care in hospitals, outpatient departments of hospitals and pre-paid group practice. Office records of physicians have not been widely used since they are notoriously incomplete, inadequate, and inaccessible. The adequacy of records as a basis for assessment poses several problems: 1) was care actually provided, and 2) was care imperfectly reflected in the written record.

  Factors which may influence the decision as to whether care was actually provided can be performance of tests or treatments prior to hospital admission, inadequate recording, or inadequate care. If it is imperfectly reflected in the written record, this can be due to a problem of completeness or one of veracity. Veracity may be due to inaccurate recording of events, or errors in data used to develop the diagnosis of plans, such as incorrect laboratory results.

Rudy (171) in "The Effect of Quality Control on Inter-Laboratory Performance" addresses the need for quality control in the clinical laboratory. In this study, four laboratories servicing hospitals and one servicing a physician's referral service were studied. None of these laboratories were using consistent quality control programs. For seven months, serum samples reflecting high, normal and low physiologic values were distributed to these laboratories for sodium, potassium, and calcium analyses. Following recalibration of instruments and required repairs, quality control programs were initiated and additional serum samples were analyzed. The results were collected and statistics calculated to determine improvement, if any, in accuracy and provision. This study showed that quality control alone will not provide improvement in results. However, it does provide the information necessary to achieve improved accuracy and provision. If the information is used correctly, it will also provide the first indication that results have begun to deteriorate in quality.

Another area of concern is that of the impact of bias by the reviewer. Helbig (84) in his study, "The Care Component Score – A New System for Evaluating Quality of Inpatient Care," addresses this issue. In this study 14 components of in-hospital care were selected as means of aggregating the impressions of reviewing physicians into a composite score. The reviewing physicians who participated had for the most part extensive experience in reviewing case summaries in hospitals prior to the trial.

A potential bias in the study was that the reviewer might rate the individual cases according to his prior impression of the hospital where care was given. In order to test the hypothesis that knowledge of hospital identity may be an important biasing factor, a random sampling was made consisting of 50 cases a year rated previously by one of the reviewers. These case summaries were retyped without reference to hospital identity and resubmitted to the same reviewer. Detailed analysis indicated that bias was operative but not seriously so. To avoid this risk of bias, the revised care component score system would insure that reviewing physicians not be aware of the hospital identity while reviewing case summaries.

Clinical chart review lends itself more readily to examining the dimensions of a technical quality of care. However, it has proven much more difficult to record and identify data on the social and psychological management of the patient, since these areas of patient care are not generally recorded on the patient's record.

The content and format of the inpatient record have long been controlled and regularized by the Joint Commission on Accreditation while the recording of information in other settings of care, e.g. physicians' offices, clinics, etc. have received little attention. The following studies indicate some areas outside the hospital where quality of care has been reviewed.

Huntley (90) described the "chart review" process in use for the General Clinics of the North Carolina Memorial Hospital. In this study, a group of physicians defined standards against which they could compare actual performance via a systematic study of medical records. Normative standards were developed by the staff for laboratory tests and examinations. If abnormalities were recorded, a set of followup activities was delineated. The medical record librarian did the preliminary review of the chart according to the predetermined criteria. A reviewing physician then examined each deficiency or abnormality and evaluated the adequacy of the entire workup and disposition. A major benefit of monitoring the quality of medical care in the outpatient clinic may have been the awareness of the necessity of recording clinical data.

Morehead (126) compared the quality of care provided in OEO Neighborhood Health Centers, a medical school affiliated hospital outpatient department, child and youth care, maternal and infant care, health department well-baby clinic, group practice programs and rural private practitioners. The study attempted to measure the extent to which infants, adult patients, pregnant patients, and post-partum patients receive medical services according to generally accepted standards of care (baseline medical audit). The level of care in medical school outpatient departments was accepted as the standard to be used. Separate sets of criteria were developed for baselines for adult medical, obstetrical, and pediatric patients. Numerical weighting was assigned to each portion of the criteria and comparisons made.

Kroeger (109) used physician office records in a study designed to evaluate quality of care in the office practice of internists. It demonstrated the dearth of available information from physician office records. The New York State Society of Internal Medicine wanted an objective tool to evaluate and demonstrate the quality of office care rendered by their members. Of the sample physicians' offices visited, only 67 percent kept records that the physician reviewers deemed adequate on the basis of legibility and completeness for non-physicians to review. Separate worksheets were developed for the pre-coding of 80 items which were considered to be essential to the workup of any patient. These were normative standards developed by the medical audit committee of the society. With additional information and tests necessary to make the worksheet for a specific diagnosis, the abstracting of essential data from the physician's office records by the non-physician seemed reasonably reliable. The abstracts were reviewed by a group of physicians from the academic setting, as well as private practice. No guidance was given as to specifics for evaluating the quality of care and the grading was the result of the individuals' subjective evaluation of the physicians. There was uniform agreement among the group, despite the absence of specific grading criteria.

The increasing concern directed towards quality of care in reference to process as well as outcome evaluation will require increased attention to recordkeeping in all settings. Sanazaro (176) clearly states that the information base must be described in an agreed-upon, organized way, with the set of standards utilized for comparative purposes. This implies that a practical method of abstracting and classifying data be developed. The standardization of terminology of patient records will have to be accomplished. The requirement for the ability to handle large amounts of data is set forth by Weed, wherein he states that the dimensions of quality control problems can never be assessed until computerization of the data is accomplished. Rapid, effective audit; the corresponding demand for explicitness in the definition of problems; and the orderly organization of the data is the main contribution that computers can make towards improving the performance and accelerating the professional development of physicians.

## MEASUREMENT SCALES

One of the necessary tools in research on quality of care is the ability to construct scales which measure a physician or institution on a continuum from best to worst. If the objective is to identify aberrant patterns of performance and correct those patterns, measurement scales may not be necessary.

All scales that measure quality of care are ordinal and arranged in order from best to worst. The intervals between one position on the scale and the next are not equal, since one cannot say that a physician who scores 80 points is twice as good as one who scores 40. Some studies have used a simple scale with few divisions which classify care into categories of excellent, good, fair, or poor. Some have even reduced the categories to optimal and less than optimal. The major disadvantage of the use of such a scale with few divisions is the possible loss of information and a lower ability to discriminate.

Other studies assign scores to portions of specified performance of care and cumulate these to obtain a numerical index usually ranging from 0 to 100. Some believe that this is the way to preserve valid information and give information on performance with respect to aspects or dimensions of care which constitute the whole. deRouville's study on peer review in biliary tract surgery utilizes reporting of final judgments by two different methods; first, an evaluation on a five-point scale as superior, good, indeterminant, poor and totally unacceptable. Secondly, a final judgment using a scale of only two categories, satisfactory and unsatisfactory. The five-point scale was included since it was believed that the opportunity for the reviewer to make some gradation in quality might be more satisfactory to him than a "yes" or "no" decision. Obviously, one would rather see the case with exceptional care receive more credit than the one which was just getting by, although each might be worthy of a final satisfactory judgment. On the other hand, it would also appear unfair to rate the case with only a modicum of unsatisfactory features in the same class as one in which all phases have been flagrantly mishandled or neglected. If the reviewer called a case "indeterminant" and was so questionable that judgment could be made either way, it would receive a final satisfactory or unsatisfactory judgment. In this study, there was fair agreement between judgments made on the five-point scale and those made on the binary, satisfactory/unsatisfactory scale.

At times it is useful to be able to attach a label which represents a quality of management on the case or the overall performance of a provider. An example of the latter was the Care Component Score development by Helbig (84). This system for evaluating quality of inpatient care was developed to assess the quality of medical care provided to handicapped children using a rating system to evaluate hospital performance and to detect weaknesses in specific components of care. Fourteen components of in-hospital care were selected as means of aggregating the impressions of the reviewing physicians into a composite score. These components are listed as follows:

- Length of hospital stay,
- Justification for surgery,
- Timing of surgery,
- Overall completeness of diagnostic work up,
- Appropriateness of routine laboratory tests performed,
- Sufficiency of number of routine laboratory tests performed,
- Appropriateness of diagnostic procedures other than routine laboratory tests,
- Use and appropriateness of consultants,
- Whether diagnostic evaluation should have been done on an outpatient basis.
- Appropriateness of medical treatment,
- Proficiency of medical treatment,
- Whether therapy could have been accomplished on an outpatient basis,

- Adequacy of follow-up arrangements,

- Overall content and quality of case summary itself.

A skill of quality levels was assigned to each question and without attempting to weight the various questions as to relevant importance, a score of 2, 1 or 0 was assigned to each quality level.

The quality level of "adequate" was assigned the score of 2, "probably inadequate" a score of 1, and "very inadequate" a score of 0. A scoring system was devised which relied on the denominator which varies in proportion to the number of applicable items allowing for the variability in the complexity of the case. The reviewing physician reviewed the judgment as to the quality of what was done and indicated those components which did not apply. A coder recorded the denominator scores for those components which did apply, coded the numerator ratings based on the reviewer's judgment, summed the numerator and the denominator, divided, and converted the result to a percentage which was the final total score for that case.

This system produces tabular output which summarizes total percentage scores by hospital and by diagnostic categories and which identifies patterns of performance by specific care components. This experimental system was found to be adequately reliable for the purpose of the care system and is a discriminating, high volume means for detecting patterns, in some quantifiable element, of quality of care by communicating these data to hospitals in a form which may serve to encourage improvement in quality of care.

One of the questions raised is whether the subscores can simply be added or whether some type of weighting must be done; and if other than equal weights are to be used, on what basis the weights are to be determined. For example, Morehead (126) in "Comparison Between OEO Neighborhood Health Centers and Other Health Center Providers of Ratings of the Quality of Health Care", attached numbers to the expected care for components within a specialty which were not equal to each other, but instead reflected the relative importance (or weight) in total baseline care. For instance, in the baseline adult medicine tables, the history was given a weight of 20, physical examination a weight of 20, whereas vital signs had a weight of 5. The components of the pediatrics baseline gave a weight of 30 to history and physical examination, a weight of 25 for immunization and a weight of 5 for screening for tuberculosis (clearly indicating the importance of immunization).

It is clear that various methods of utilizing measurement scales are far from perfect and will need to be continually refined.

## CONCLUSIONS

The following considerations are proposed for improving quality of care assessment.

- The definition of quality should go beyond the merely technical aspects of care to include the many dimensions that make care meaningful and acceptable to clients, providers, and to the community at large.
- The primary emphasis should be on pervasive patterns of care rather than on pointing out individual wrong doing.
- The primary objective of quality assessment should be educational and rehabilitative rather than punitive and destructive.
- Methods of concurrent review for process evaluation and intervention during the course of management seem indicated.
- Emphasis should be given to positions of content, assessment, and techniques in the ambulatory care setting.

# OUTCOME APPRAISAL OF MEDICAL CARE

by Barry Decker, M.D.

The prospectus of the California Center for Health Services Research, as quoted by Carl Hopkins (81), provides a somewhat research oriented, but none the less apt, definition of outcome evaluation.

> "... to improve the effectiveness and efficiency of personal health services through research and demonstration focused on the development and test-use of criteria for measuring the outcomes, on carefully defined population groups, of selected practices and systems of medical and related services."

From a historic perspective, the use of results to validate specific medical processes is as old as Hippocrates and as rich as clinical research. It is commonly accepted medical practice to validate new chemical procedures by established methods; to evaluate antibiotics by their ability to suppress bacterial growth, sterilize body fluids, and induce clinical remission; to measure the value of cancer chemotherapy by the prolongation of life; and to select surgical procedures by their ability to preserve life, improve function, and minimize risk.

In an excellent review, Lembke (118) discussed the historic application of these professional principles to the more circumscribed field of medical audit, which he defined as a "systematic review and scientific evaluation of medical care". Shortly after 1910, Codman, who was a prime mover in the establishment of certification for surgeons and a nationwide survey of hospitals, "described forms and methods, and published an abstract of every case admitted to his hospital. . . classifying results as favorable or unfavorable. His system required at least one re-evaluation of the case a year or more later, until a condition of stability permitting final judgment had been reached."

Unfortunately, political pressures at the time dictated the use of minimal hospital standards (structural appraisal) for accreditization rather than such detailed audits of medical process or end results as Codman advocated. The Joint Commission on Accreditation of Hospitals, however, which continued this work in 1952, stimulated new interest in medical auditing, particularly through requirements for medical staff committees to conduct case reviews.

The need for greater efficiency and minimizing physician time in the conduct of large scale reviews, and the growing availability of computers, led to the development of abstracting and tabulating systems to permit the monitoring and comparative evaluation of specific indices of performance and some indices of end results. In his review, Lembke specifically recommends the comparison of hospital indices with similar population based indices for the service area. Unfortunately, he notes, "when such community incidence rates were employed, they did not adequately distinguish between the quality of care in individual hospitals where there was more than one hospital in the community. . . and did not help to evaluate the work of individual physicians working in the same hospital." Based on his experience in Rochester, Lembke recommended the following base for a modern scientific medical audit:

(1) individual case analysis, by specific disease or operation, using explicit, objective criteria;

(2) community wide epidemiologic data to independently check the results obtained by case analysis; and

(3) comparative analysis to determine the accuracy of tissue, laboratory, and radiologic examinations.

Every attempt at medical auditing, and most reviews of work in this field, recognize, and at least pay lip service to the importance of outcomes in the evaluation of the quality of medical care. Unfortunately, as Shapiro (176) has noted, "the desirability of determining quality of medical care by its effects on some measurable aspect of health is matched by the pessimism among researchers about the possibility of success in dealing with the issue." The pessimism, which Shapiro noted, was entirely warranted by the scant number of publications dealing with outcome evaluation until very recently; and by the still existing lack of uniformly acceptable outcome criteria and widely used methodologies for outcome evaluation.

Given the generally accepted validity of outcome evaluation, and its failure to be widely implemented, it seems reasonable to organize this state-of-the-art paper around difficulties inherent in the conduct of outcome evaluation. Accordingly, the balance of this paper will deal in turn with:

- the definition of outcomes
- approaches to outcome evaluation
- requirements for outcome evaluation
- patient outcome indicators

- techniques
- comparative evaluation
- implications for medical care appraisal

## The Definition of Outcomes

There is a considerable lack of uniformity, among various investigators, concerning the definition of outcomes. Clearly, the complex interrelationships between real life events, differing professional and non-professional viewpoints, and the purposes of evaluation all contribute to this difficulty.

The words "outcome" and "end-result" have often been used interchangeably, but, in fact, have quite separate meanings. An outcome may be defined as the result or consequence of any process; an end-result is either the final outcome in a sequence or an outcome which relates to the specific objective under consideration. Mortality is the only uniformly acceptable end-result because of its self-evident finality. Other end-result parameters used by different investigators vary with the purposes and the viewpoint of the evaluator.

Densen (45) classified end-results in accordance with varying viewpoints. He listed mortality, morbidity, and functional status as end-results from the medical viewpoint; access to care as an end-result from the individual patients viewpoint; and the level of unmet health needs as the end-result from the community viewpoint. Brook studied the quality of medicine in a Neighborhood Health Center (25). With a sensitivity to the multi-dimensional social purposes of the Neighborhood Health Center, he used patient perception of the quality of care, evidenced by compliance, satisfaction, and return, as the end-result of organizational success. In a study of M&I projects (124), Levin was primarily concerned with the relationship between cost and product as an outcome indicator. Interestingly, he clarified the distinction between cost-benefit ratios, which compare costs with medical benefits translated into dollar terms, and cost-effectiveness ratios, which compare costs with health values in non-monetary volumetric terms. Last (111), Johnson and Rosenfeld (90), and Vail (197) primarily emphasize utilization, workloads, waiting time and other volumetric parameters as programmatic outcomes in various health care settings.

In an important work (171), Sanazaro and Williamson used a modified critical incident technique to study the perceptions of 1211 privately practicing internists with academic appointments, concerning effective and ineffective performance. They were able to abstract 6276 end-results or outcomes from the reports of 2798 patient care episodes. Twelve major categories of outcomes were derived from this material.

> "A basic distinction was made between 'patient end-results' and 'process outcomes.' In the former, the end-results refer specifically to changes in the patient as a person or in the attributes of the disease or condition. The six major categories so classified are: changes in longevity, physical abnormalities, physical symptoms, psychological abnormalities, psychological symptoms, and function. Changes in any of these for the better, or more commonly, for the worse can and do occur during the natural history of the disease. None of these categories is uniquely dependent upon medical intervention. In contrast, process outcomes occur only when the patient receives medical care. The six categories, so classified are: attitudes toward the physician and the episode of care, attitudes toward and understanding of the condition, compliance, incurring or avoiding unnecessary risks in medical care, hospitalization, and costs of care. These do not occur during the natural history of disease in the absence of medical intervention."

The California Center for Health Services Research, according to Hopkins (81), "will seek to develop and apply improved criteria for determining the outcomes of personal health services, including, (a) health status of persons served (mortality, morbidity, disability), (b) volume of services provided, (c) cost effectiveness of services provided, and (d) quality indexes such as peer judgment (medical audits) and patient attitudes."

The multiplicity of approaches to the definition and classification of outcomes, evident in the literature, strongly suggests that none has universal applicability. The practical purposes for which this paper was written, however, require precise definitions and common usage.

It is suggested that the use of the term "end-results" be discontinued for two reasons. The first is the variable nature of "end" results depending upon the purposes and the perspectives of the evaluator. The second is that the term implies a discordance with the need for continuing medical care and, in a linguistic sense, is in conflict with the major thrust of contemporary medicine.

The following specific definitions are suggested:

The results or consequences of any disease or medical intervention, whether intermediary or final, are outcomes; outcome evaluation is the measurement and collection of such results for comparison with accepted standards. Because of differing purposes and data sources, it is suggested that outcome parameters be classified as:

> *Patient Outcomes* – mortality or survival, physical or psychological morbidity, and level of function

*Process Outcomes* – patient satisfaction, understanding of disease, compliance with medical regimens, and altered level of risk

*Administrative Outcomes* – utilization, work loads, time intervals, and other volumetric measures of managerial interest

*Economic Outcomes* – cost-benefit or cost-effectiveness measures.

### Approaches to Outcome Evaluation

Shapiro (176) has called attention to the difference between direct and indirect methods for outcome evaluation. The former require a carefully structured environment, with experimental and control groups differing or adjusted to differ only for the test variable. In the direct approach, outcome parameters are prospectively collected to measure the influence of the test variable. In contrast, indirect methods begin by detecting differences in outcome parameters for subsequent retrospective analysis of the reasons for these observed differences.

The direct approach to outcome evaluation is most useful in health service research to validate specific hypotheses. The nature of this effort and limited sample sizes permit one to structure such ideal circumstances. The indirect approach, on the other hand, is far more useful in medical care appraisal, where monitored results, explanations, and subsequent modification of performance are the major goals.

In summarizing the distinction between direct and indirect approaches, Shapiro succinctly observed,

> "In short, the application of the indirect approach in end-result studies will....depend on a careful determination of the appropriateness of extending the results from direct studies to other situations and an assessment of the qualifications of doing so in a specific instance. Despite these complications, the indirect method should have a great appeal. It does not require the observation of two groups for later comparison and study can usually be carried out relatively quickly. Often conclusions could probably be based on the existing information and modest extentions of it. The rub, is that the indirect approach must wait for evidence from the direct method and this has been a long time in coming."

In the direct approach, the collection of outcome parameters concludes the study; in the indirect approach observed outcome parameters initiate the study. Nevertheless, despite these sequential differences, both methods depend upon the same elements of evaluation, including:

(1) *Outcome Parameters* – the dependent variable results or consequences of disease and/or medical intervention;

(2) *Evaluation Objectives* – the independent or test variables under investigation, such as the adequacy of a medical regimen, or the quality of medical care in a specific setting;

(3) *Evaluation Subjects* – physicians, hospitals, health service systems, patients, or populations;

(4) *Evaluation Design* – experimental (direct) or analytic (indirect) methods to control or adjust for extraneous variables.

Controlled or adjusted comparison is common to all outcome evaluation approaches. The evaluation subjects may be compared with each other at any point in time; with themselves longitudinally over a period of time; or with normative standards or empiric averages. The comparisons may be specific for diseases, procedures, geographic areas, or patient mixes.

Medalie and Mann (132) offer an example of the potential for outcome evaluation comparisons. Their objective was to evaluate the quality of medical care in a Neighborhood Health Center in Jerusalem.

"The four major methods by which the work of the Health Center could be evaluated are:

(1) By comparing data for the neighborhood's health state before the Center began functioning against data at the end of certain periods. However, the program was initiated without any real consideration or pre-planning for evaluation, thus ruling out this important method of comparison.

(2) By comparing the neighborhood with a similar one, but with a different type of health service. Unfortunately, we were unable to find a neighborhood which was comparable in its demographic structure, as well as having reliable statistics.

(3) By extracting from the national figures a matched sample. Unfortunately, suitable data were lacking.

(4) By comparing the local figures with the national ones on a "one-shot" basis, as well as using the latter as a "moving indicator". We were forced to use this as the main method, in addition to more subjective ones, such as discussing whether the center had carried out its pre-determined principle of practice, as set out above."

Most outcome evaluations, published in the literature, can be classified, and perhaps best appreciated, in relation to their varied purposes: (1) Evaluation Research, (2) Health Services Research, and (3) Managerial Evaluation.

Evaluation research provides the development and validation of both criteria and methodologies for outcome evaluation. It is a rigorous discipline whose goal is to provide tools for other investigators. Health Services Research, an equally rigorous discipline, uses these tools with an emphasis on the comparative analysis of different health delivery models. Both approaches generally deal with small samples and well controlled, prospective direct methods; neither approach accepts ongoing managerial responsibilities.

Managerial evaluations, on the other hand, are designed to monitor outcome performance in order to detect unusual trends for in-depth analytic study and corrective action. Managerial evaluations tend to use indirect methods to compare individual or group performance with accepted outcome standards. A rigorous approach is often compromised by the volume of work and the competing demands of ongoing operational activities. Managerial evaluations are entirely dependent upon the prior development and acceptance of outcome performance standards and methods of evaluation, usually validated by other more rigorous approaches.

A number of performance standards, covering administrative and economic outcomes, are available for managerial evaluation. These standards are generally empirically derived and include examples such as the PAS length of stay norms by diagnosis, and regional levels for customary and usual fees. Normative performance standards for the frequency of ambulatory visits by diagnosis are now being developed in a number of EMCRO's and will be available for managerial evaluation.

Performance standards, for managerial use, covering patient and process outcomes are not yet commonly available. John Williamson's Health Accountant Approach (208) offers a strategy for the intra-institutional setting of such standards as well as a means for the conduct of managerial outcome evaluations. This approach will be discussed at greater length in the section of this paper dealing with techniques.

### Requirements for Outcome Evaluation

All evaluation depends upon the availability of subjects for study. The interaction between patients and physicians, in various settings, provides the laboratory for medical evaluation. Classic medical auditing, and most similar forms of process evaluation, deal only with the brief time interval during which medical interactions occurred when services were actually delivered. In contrast, outcome evaluation poses an additional requirement for follow up information concerning the results or consequences of the patient-physician interaction. This requirement is particularly pertinent to those evaluations dealing with patient or process outcomes.

Follow-up data for outcome evaluation may be sought directly through longitudinal studies of specific patients. This approach was suggested very early by Codman, has been used extensively in clinical investigation, and has provided the design for most prospective health services research involving outcome evaluation. This approach is also uniquely suited to outcome evaluation in prepaid group practice, where a specific medical resource is responsible for the total and continuing care of a defined population (176).

Indirect methods for the collection of follow up outcomes are also available and are generally more pertinent to the requirements of large scale medical care appraisal in non-group settings. These methods depend upon the collection of vital statistics, household survey data, or the application of epidemiologic estimates to specific populations for whom an aggregate of medical providers are responsible. The ability to identify such defined populations, and to retrieve other sources of linked data describing the population, are obvious requirements for this approach. Lembke (118) advocated the use of such epidemiologic indices as an independent check on case audits. The National Academy of Science (77) has developed a tracer methodology, dependent upon this approach, which will be discussed in greater detail later in this paper.

The collection of outcome data, from defined populations served by an aggregate of medical providers, also serves to define unmet medical needs and to determine the impact of a specific program on its target community. This use of indirect outcome methods is equally pertinent to prepaid and non-group settings of practice. The work of Decker (42), in the Northeast Ohio Regional Medical Program, comparing population based hospital discharges for specific diseases with mortality in the same populations is a good example of this usage.

It has already been suggested that follow up information is most necessary for patient and process outcomes which deal with altered health status and patient satisfaction; or conversely, that most administrative and certain cost outcomes are already evident at the time that services are delivered. To the extent that administrative and cost concerns are viewed only from the provider or institutional perspective, this is true. From the viewpoint of social planning and public administration, however, populations rather than institutions are the prime denominator. To meet these evaluatory requirements, administrative outcome indicators need be aggregated in terms of the population served. For example, the number of visits to a specific diabetic clinic, need be translated into the number of visits for diabetes per thousand population or per thousand population at risk. Densen (81) aptly described the former approach as administrative or professional centering and the latter as population or patient centering. Clearly, patient centered outcome evaluation requires the definition and appropriate aggregation of outcome data by service populations even though the nature of the administrative outcomes do not require longitudinal follow up.

One additional requirement for outcome evaluation has been stressed by a number of investigators; namely, the need for adequate, accurate, and well designed record systems. As Densen (81) has aptly stated, "if we wish to get on with the task of evaluation . . . I wish to point out the importance, indeed the absolute necessity, of an effective record keeping system . . . to appraise health care services and programs."

Cammarn (30) has described a computerized summary of patient records in the diabetic clinic of University Hospitals, Cleveland. She pointed out the increased legibility and use of the records, emphasizing both the service and investigational potential for such completely integrated and retrievable records. Weed (199) is developing a computerized problem oriented record. While his primary motive is process evaluation of the individual student or practitioner, the potential for in-depth outcome evaluation from such detailed and easily retrievable longitudinal records is obvious.

Densen (81) has emphasized that, "for evaluation purposes, the approach to the record keeping system should be made from an edpidemiological point of view – not a computer or accounting point of view. This means identifying the population at risk and those individuals in the population who experience this risk." Because of his concern for public accountability and measuring the extent to which health program objectives are achieved in outcome terms, Densen has emphasized the need for:

(1) record systems maintained on a population or patient basis rather than on an accounting, administrative, or professional basis, and

(2) the linkage of health service records with other bodies of outcome data such as vital statistics.

Dearing (40) has described the basic items of information for a record system as developed by the Group Health Association of America Research and Statistics Division. This system includes a population file to describe each subscriber and a utilization file to describe each specific service. With proper linkage, the system provides the opportunity to develop indices of service both in relation to the population served and to management centers.

In essence, these observations can be succinctly summarized in the following requirements for outcome evaluation:

(1) longitudinal follow up of specific patients for controlled, direct outcome evaluations, as in health service research;

(2) A defined population for study, to permit the independent collection of outcome parameters for indirect outcome evaluation, as in most medical care appraisal; and

(3) record systems developed on a population basis to permit linkage with other outcome data sources and to permit the evaluation of services in relation to community rather than administrative or professional needs.

## Patient Outcome Indicators

One of the major difficulties preventing the more widespread use of outcome evaluation has been the lack of suitable and acceptable indicators for the health status of patients and populations. This section discusses several approaches to this problem.

Hagner, LoCicero, and Steiger (76) studied patient outcomes in a sample of 174 selected patients registered at the Comprehensive Medicine Clinic of the Temple University Medical Center. "Two independent judges measured outcomes by using a rating scale that attempted to make explicit the criteria of change. Considerable mutual training took place between the judges, and a reasonably high reliability was achieved." The commitment of professional time to interviews makes this approach impractical for large scale medical care appraisal. Nevertheless, the example is quoted to illustrate the commonest available method for estimating health status, namely, the codification of multiple, explicit, expert opinions.

In certain medical situations, objective tests are available to verify the necessity for treatment or quantify patient improvement. The work of Sparling (188) comparing the percentage of pathologically positive appendectomies (ruptured or acute) in five Baltimore hospitals is an example. Similar usage provides other objective patient outcome indicators in the clinical laboratory, radiology department, or surgical pathology suite.

Patients with chronic diseases present special problems for quantification. The Barthel Index (129) measures the degree of independence in performing most routine functions and has been used to measure the results of rehabilitation. Ellwood (60) has described the approach used at the Kenny Rehabilitation Institute to integrate multiple semi-objective criteria to grade the patient's level of rehabilitation. Densen (45) has commented on the multiplicity of indicators to quantify the Activities of Daily Living. He recommends, and is now working on, a uniform scale. Criteria to justify the diagnosis, and more importantly, scales to measure alterations in the level of the disease have been recommended by professional specialty societies for rheumatoid arthritis and rheumatic fever.

Mortality is a common patient outcome indicator which has been widely used in epidemiology, clinical research, and in the monitoring of hospital care. Techniques for the treatment and age, sex, and race adjustment of both crude and disease specific mortality rates are well established in the literature.

Relative survival rates are a variant of mortality data and a useful criterion for measuring the effectiveness of treatment for most chronic diseases. Axtell (10) has presented a simple method for analyzing the survival experience of a small series of patients based on five year survival probabilities computed by the National Office of Vital Statistics. The method has the specific advantage of being easily automated.

Decker (42) has utilized regional disease specific mortality rates, in frequently fatal diseases, as a surrogate for prevalence in comparison with population based hospital utilization for these same diseases. The method permitted comparative studies of the use of hospitals in relation to need for different populations defined by socio-economic considerations.

Roemer, Moustafa, and Hopkins (167) have attempted to utilize crude hospital mortality rates to compare the quality of different hospitals in Southern California. They recognized that hospital mortality is often a function of patient mix. Their studies demonstrated that crude hospital mortality correlated best with length of stay or occupancy adjusted length of stay which they accepted as a surrogate for the severity of the patient mix. They recommended use of the hospital death rate adjusted for severity by occupancy adjusted length of stay as "a more objective outcome measure of the overall quality of hospital performance than the currently used measurements based principally on examination of hospital inputs".

Several major efforts have been conducted to quantify the health status of a population. Chiang (32) attempted to define an index of health by mathematical models which incorporate the number of illnesses, the duration of illness, and the time lost to death in a specific population. Unfortunately data limitations forced the use of physician visits as a surrogate for the number of illnesses and required total exclusion of the severity of disease from consideration.

Lawton, Ward, and Yaffee (112) used the statistical technique of factor analysis to define the dimensions of health among older men and women. Their data sources included interviews with 149 residents of an old age housing unit, medical examinations and pertinent records. Their findings suggested multiple rather than unitary definitions of health depending upon the perspective used (patient, physician, or behavioral) and the use of the index (life insurance, military service, etc.).

Sanders (174) editorially explored the paradox of a high level of chronic disease morbidity in Kit Carson County in the presence of low mortality, good medical resources and reasonable utilization. He deduced that good medical care leads to prelongation of life and a high rather than a low level of chronic disease. He suggests modifying life tables for full function life expectancy and measuring community health levels in terms of anticipated productive man years. He places particular emphasis on the use of this parameter in determining the allocation of medical resources.

### Techniques for Outcome Evaluation

The techniques for outcome evaluation are as numerous as the investigators performing them. In essence, each study defines its own methodology in relation to specific objectives. In this section, three studies illustrating specific approaches and two generalized techniques, recently introduced, will be discussed.

Thompson, Marquis, Woodward and Yeoman (195) compared perinatal mortality in two Air Force hospitals. Their assumptions were that differences in the populations served, limited access to medical care related to financial barriers, and quality differences related to the organization for the delivery of medical care would be minimized in the comparison of two Air Force Hospitals. Perinatal mortality and prematurity (birth weight of less than 2,500 grams) were used as outcome parameters for this evaluation. The authors found no significant difference between these rates in the two institutions. Careful evaluation of the data, however, revealed that:

- black mothers had significantly higher perinatal mortality in one hospital;
- white primiparas had significantly higher perinatal mortality in the other hospital; and
- oriental mothers with white caucasian husbands had the highest perinatal mortality in both hospitals.

Thompson et. al. were unable to find adequate explanations for these specific findings. The importance of this study is to illustrate the use of outcome evaluation to compare two institutions and to generate research questions for further study.

Brook and Stevenson (24) studied a cohort of 141 non-emergent patients at the Baltimore City Hospital Emergency Room, selected by virtue of their referral to the radiology department for gastro-intestinal, barium x-ray, or gall bladder studies. Simple process criteria were developed for minimal diagnostic workup and minimal therapeutic follow up. Patient outcomes, including longevity, level of further symptomatology, work loss, hospitalization and surgery were determined by patient interviews and were compared with diagnostic and therapeutic processes as evidenced in the record.

Inefficiencies in the diagnostic process were noted by the authors. "Of the 131 patients interviewed, 40 (30 percent) sought additional professional help from other sources of care. Furthermore, only 37 patients out of the 98 interviewed patients who had completed an x-ray examination (38 percent) could recall being told the results or had any knowledge of the results."

Similar inadequacies in the therapeutic process were noted. Even with minimal process treatment criteria, "only 37 percent of patients with abnormal results appeared to be receiving appropriate therapy."

An attempt was made to compare outcome parameters to this inadequate medical care. "Examination of the cohort of patients with duodenal ulcers revealed that only one out of these nine patients received therapy; he missed less than one week of work and was asymptomatic at follow-up interview. Of the remaining eight, six missed more than one week of work, and all eight retained the previous levels of symptoms at follow-up study." Brook and Stevenson concluded that poor quality care was evident at one of Baltimore's best institutions despite the adequacy of its staffing and the minimal nature of the criteria used.

Last and White (110) studied the content of medical care in eight general practices in Vermont using Eimerl's method for indexing conditions and simple modifications to record outcomes. While the specific study was too small to draw valid conclusions regarding the content of general practice, it did demonstrate a simple reproducible method for evaluating administrative outcomes in practice. They were able to document the comparative practices with regard to diagnostic mix, age and sex, referral rates, hospitalization rates, visits per condition, and contacts per patient.

The National Academy of Sciences (77) has developed an interesting methodology for the evaluation of the quality of care in Neighborhood Health Centers which may have wide applicability for medical care appraisal in general. The methodology depends upon the identification of a specific population for which a provider (or group of providers in the aggregate) are responsible. There is a clear indication that provider responsibility is seen to extend to the health of the population and not to the more limited requirements of symptomatic health care. Application of this plan also requires the availability of demographic information characterizing the service population.

Certain specific diseases were selected as suitable tracers to monitor health care in this setting, because of:

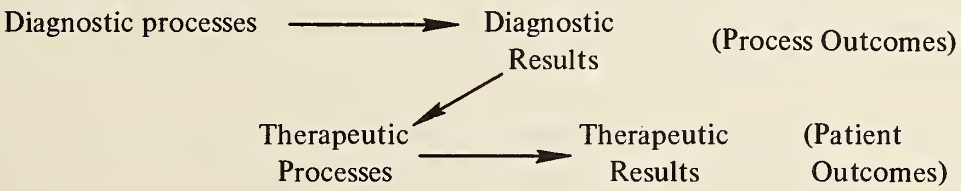
- a significant impact on the population
- easy diagnosis
- high prevalence
- known care which can alter the course of the disease
- existing consensus concerning appropriate care
- well defined epidemiology.

Six diseases, from a larger list, satisfied these criteria and were selected as tracers. They included: (1) middle ear infection with or without hearing loss, (2) visual disorders, (3) iron deficiency anemia, (4) cervical carcinoma, (5) essential hypertention, and (6) urinary tract infection.

Process standards for desirable medical care were developed for each of these conditions and documentation of the known epidemiology compiled. The evaluation plan involves both an outcome evaluation of the Neighborhood Health Center's impact on its target population by edpidemiologic methods and a process audit of the quality of medical care rendered. The methodology is sound, well documented, and applicable to any situation where an aggregation of medical resources accepts responsibility for the health of a defined population.

A generally utilizable strategy for relating outcome and process assessment has been proposed by John Williamson (207) and is being implemented with the support of NCHSR&D for his Health Accountant Project (208). This work was referred to earlier, and provides a means for the setting of outcome performance standards within an institution to permit managerial outcome evaluations.

Williamson's basic assumption is that all medical process does not need to be studied; rather, the first problem for study is to identify those processes in need of corrective study or action based on inadequate outcomes. With minor translation he envisions medical care to involve the following dynamic events:



For any given diagnosis, his studies are designed to establish the percentage of false positive diagnoses (erroneously diagnosed) and the percentage of false negative diagnoses (undiagnosed cases). When deviations from self determined expectations exceed the 95% confidence level, evidence exists of the need for further process evaluation and educational correction. Though not made explicit in Williamson's work, this approach requires the ability to identify accurate diagnoses by a specific test or the application of a defined set of criteria.

The adequacy of therapy is measured by an available outcome parameter, again seeking deviation from self determined expectations beyond the 95 percent confidence level to indicate problems for further evaluation and educational correction. In the illustrations quoted, Williamson used acceptable mortality as the outcome measure, however, the technique would be easily adaptable to any other available and measurable outcome.

The approach has conceptual advantages to recommend it. It may also avoid considerable wasted effort measuring processes, through medical audits, which make little difference in outcomes.

## Comparative Evaluations

The important use of outcome evaluation to validate or question process evaluation is illustrated by the following studies.

Brook, Appel, Avery, Orman and Stevenson (26) studied the effectiveness of inpatient follow-up care during the course of 403 discharges from the medical service of a teaching hospital. The patients all had chronic diseases and were studied by both record review and interview. Outcome measures included the current state of symptoms, activity levels, and ambulatory function. Process measures included the frequency of post discharge visits, compliance with the prescribed medical regimen, and the presence of a designated source of continuing care at the time of the follow-up visit. Based on the application of minimal criteria, which almost any physician would accept, only 66 percent of the discharged patients received acceptable follow-up care.

"There was a significant correlation between medical care process and outcome. A large percentage of the variation in the outcome variable, however, was not explained by the process variable. Since patient outcome depends on many non-medical as well as medical factors, outcome cannot be predicted through examination of the medical process alone. Evaluation of the effectiveness of medical care is dependent on collection of both process and outcome data."

Helfer (78) estimated the quality of patient care in a pediatric emergency room with internally developed process criteria for an adequate physical and history. Independently, an expert subjective judgment of the quality of care was made retrospectively by a senior staff physician. When knowledge of the details of the audit was disseminated among the interns, who staffed the pediatric emergency room, there was significantly greater compliance with the process criteria but only modest gains in the quality of care, as separately judged by experts. This study raises doubts about the value of process conformity or the specific process criteria chosen for the experiment.

Lewis, Resnik, Schmidt, and Waxman (125) studied five major chronic disease diagnoses among 66 subjects randomly allocated to a regular medical school clinic and to an experimental nurse practitioner clinic. The study was duplicated in a metropolitan general hospital with 53 patients cared for by the nurse practitioner and 85 patients followed in the regular medical clinic.

Nurse practitioners were asked to report critical incidents in treatment according to the model previously described by Sanazaro and Williamson (171). These critical incidents differed from those which Sanazaro and Williamson gathered from internists. Not surprisingly, the nurses emphasized supportive activities, while the internists emphasized diagnostic activities. The nature of the study population, including patients with established chronic diseases, may have contributed to this difference.

Lewis et.al. estimated outcomes in both the nurse practitioner and physician treated patients by the following parameters:

- mortality
- increase in employment
- level of discomfort
- broken appointments
- criticisms of the medical care received
- use of other medical care resources

By all outcome criteria measured, the patients treated by nurse practitioners demonstrated results as good or better than those treated by physicians. The implication that care oriented towards a supportive role for patients with chronic disease may be more beneficial, has important implications for the validity of process criteria for care, in similar diseases, generated by diagnostically oriented physicians.

### Implications for Medical Care Appraisal

Despite early recommendations favoring outcome evaluation, medical care appraisal has been dominated by process methods which depend upon case review and, more recently, statistical displays. Both inherent difficulties and an emphasis on hospital settings contributed to this overshadowing of outcome studies. Nevertheless, outcome evaluation continues to be recognized as an important, if not critical, element of medical care appraisal by most authorities.

The use of outcome evaluation in large scale medical care appraisal will remain limited until simple, reliable indicators of the health of individuals and populations become available. The final effort of this state-of-the-art paper will be to help define a current role for outcome evaluation.

Two general uses are suggested, consistent with the definitions developed earlier in this paper. The first is the critical task of validating both the criteria and methods used in process evaluation. This will require careful health services research, in limited and controlled experimental environments, to determine the value of current process criteria by patient and process outcomes. By implication, it will also require the sensitivity to modify process criteria promptly in response to these research findings.

The second general use for outcome evaluation, in regional medical care appraisal, is to generate and evaluate regional norms for administrative and economic outcomes and to utilize these norms for the review of regional performance. Current use of PAS, QUEST, and HUP utilization data offer examples of this usage.

Three additional uses for outcome evaluation are appropriate to specific settings within a regional medical care appraisal system, including:

(1) monitoring the impact of health service programs on defined target populations;

(2) evaluating the quality of medical care in prepaid group practices with stable populations for longitudinal study;

(3) defining problems for process study, within institutions, by the Williamson Health Accounting strategy.

# DATA PROCESSING SYSTEMS FOR MEDICAL CARE APPRAISAL

by Paul A. Bonner

## I. INTRODUCTION

This paper is composed of summative, factual descriptions of major data processing systems currently proposed or in use for the appraisal of hospital and ambulatory care. Its intent is to present the significant elements of each system description abstracted from previously published papers. No attempt was made to develop a critical analysis of the advantages and disadvantages of each system. Significant emphasis has been placed on hospital discharge abstract systems, as reported by the well-known Airlie House Conference, due to their advanced stage of development and use. Although less developed and smaller in number, various reports on major ambulatory data systems have been abstracted. The paper attempts to present the reader with a concise yet comprehensive array of various health information systems that now represent the current state-of-the-art.

### A. MEDICAL INFORMATION SYSTEMS (MIS)

It has been demonstrated by several studies that approximately one-fourth (25 percent) of total hospital costs are incurred by information handling. Consequently, there is an increasing need to incorporate modern technology into the establishment of more efficient hospital or medical information systems.

However, the implementation of a computerized medical information system has proved to be an extremely difficult process with the possible exception of the administrative areas of a hospital. This has been evidenced by long-term commitments of large amounts of money and by scarce medical and engineering specialists. To complicate this, there are stringent requirements for size, speed, and reliability of hardware, not to mention the difficulty in defining and standardizing the medical care process itself.

A medical information system may be defined as one that uses electronic data processing and communications equipment to provide on-line processing (possibly with real-time response) for patient data within one or more medical centers, for both inpatient and outpatient services. A hospital information system (HIS) may be defined as a subsystem of an MIS that processes inpatient medical data, e.g., laboratory, x-ray, ECG reports, etc. Other subsystems of an MIS might include a laboratory data system which processes clinical laboratory data for inpatient and outpatient services and a hospital administrative information system which processes administrative and business functions, e.g., bed census, admission procedures, and scheduling.

Collen (53) has defined the objectives of an MIS as:

(1) Communicate patient data from professionals providing medical care (doctors, nurses, technicians, etc.) into a patient's computer medical record and to other professionals (e.g., dietician), and to hospital services (e.g., radiology).

(2) On demand or on schedule, communicate information from the patient's computer medical record to professionals and hospital services.

(3) Establish files and communicate information for scheduling of patients, personnel, and medical care services. Communicate between services, e.g., nurses' stations to radiology.

(4) Establish a medical data base that has a high utility for medical services for the individual patient and physician.

(5) Establish a medical data base that can fulfill research objectives for clinical, epidemiological and health services research.

(6) Establish a data base for business and administrative functions, including projection of needs and planning for services.

(7) Improve cost containment and quality of medical services.

(8) Have capacity for (a) an increasing number of patients and of doctors and (b) progressive expansion of the health service system subcomponent.

To meet these objectives there are a number of requirements which must be satisfied. These include:

- General and extraordinary requirements
- Personnel
- Computer Record and Patient Identification

- Equipment
- Reliability
- Control
- Utility
- Economy
- Time Planning

In fostering the continued development of an MIS the following goals should be recognized and supported. These include:

(1) Determining an effective size of regional computer centers for medical information systems for groups of cooperating hospitals and health service systems.

(2) Determining a more efficient organization for computer stored, continuing medical files, oriented to both patient care and medical research.

(3) Developing new, super-mass random access, storage files to handle the immense amount of medical data generated from a community of patients.

(4) Developing more efficient and acceptable terminals for physicians and other personnel to communicate with the computer. Graphic displays may become essential for high density data outputs and even pictorial displays may be desirable.

(5) Developing improved communication systems for transmitting compatible data between medical centers within a region.

(6) Developing means of positive patient identification to be applied uniformly throughout the country.

As can be readily seen, the requirements for planning and implementing an MIS are extensive with regard to capital, personnel, and organization. In addition, the requirements for high reliability and user utility for real time systems substantially increase hardware and software needs. The magnitude of an MIS details the need for carefully planned time phasing and modular implementation.

## B. HOSPITAL INFORMATION SYSTEMS (HIS)

The generic category of an HIS is quite broad and includes automated information sources, data transformation and management requirements, and user information needs in a patient care facility. These requirements are included in such organizational elements as:

(1) Medical Staff

(2) Admitting

(3) Medical Records

(4) Nursing Units

(5) Diagnostic Services

(6) Therapeutic Services

(7) Administrative and Business Functions

(8) Support Operations

(9) Communications

Each of the above organizational elements generate and use patient information. It has been estimated that the cost for patient record keeping and information handling averages $20/patient day (261). Motivation for the development of an HIS has been described as being two-fold:

(1) The cost and information handling could be considerably reduced, and

(2) Improvements in patient management should result from having more information immediately available, from both medical and administrative viewpoints.

The broad system for computer-based medical information management in a health care institution should be directed to the problems of patient management and directly serve the tasks of patient care administration, i.e., diagnosis and therapy. Basic to meeting those demands are the problems of collecting, storing, transforming, and displaying basic data on command. As a consequence, efforts to design and implement data management systems have frequently (and appropriately) been specific task oriented where the output data as well as the problem have been well defined. A viable HIS is logically, then, a conglomeration of relatively discrete information subsystems.

These discrete subsystems must be integrated into a smooth information handling capability with capacity to correlate and collate as much information from each subsystem to provide a comprehensive view of medical/administrative patterns and problems. An HIS must primarily contain the patient record and must acquire, organize and retrieve these data upon command. Current records are usually stored in high-speed memory in a central data bank (computer) to allow recalling and updating from remote terminals in a short period of time. These terminals can be distinguished not only by appropriate hardware but also by which programs can be accessed to process data in the central bank.

Since the modern hospital is not a single homogeneous activity, it has been recognized that the development of different but intertwined subsystems will occur at differential rates. Consequently, this differential awareness of the need to automate has militated against the development of a total HIS.

## C. STATEWIDE/REGIONAL MEDICAL INFORMATION SYSTEMS

Statewide or regional medical information systems have been widely discussed for the past two decades with concepts markedly being altered during this period. In light of the variety of viewpoints, it is worthwhile to examine recently proposed alternatives, problems, and reasons for the lack of any current statewide or regional systems.

Ideally, an MIS should be comprised of individual subsystems, e.g., hospital and nursing home record systems, outpatient records, office records, etc. (53). Professional participants of such conceptual ventures have been cautious about this type of centralized planning. Preferences have rested with the ability and right to adapt information systems to local strengths and needs. In addition, very few efforts to develop even small subsystems have succeeded. Of the small number that have succeeded in any one institution, even less have grown into other institutions and these subsystems deal solely with hospital practice. The concept of a true statewide or regional MIS will involve coordinated data collection and use by various types of health care providers and users.

To establish a statewide MIS, listing of practitioner, facilities, utilization and actual patient records would have to be generated from general hospitals, outpatient clinics, physicians' offices, and medical records from specialized facilities such as V.A. hospitals, mental health institutions, infectious disease institutions, cancer hospitals, nursing homes, convalescent facilities, VNA services and drug retailers. Only this set of providers, at a minimum, would provide a picture of the true cost of illness versus hospital costs as well as a picture of the way in which patients are able or the reasons why patients are unable to obtain care.

To say the least, the formation of such a network will require enthusiastic participation of various private, and quasi-private institutions; substantial development and operating costs; solution of complex technical obstacles, and successful resolution of probing social questions. In the past, medical planners have tended to under-emphasize or ignore the social implications or interface with the public associated with a statewide MIS. Having chosen to avoid those fundamental issues and problems, the "constituency" of such a system still remains within the inner circle of "computerniks."

Lindberg (53) has attempted to identify the reasons for the initial lack of statewide information systems under two main headings: social and technological.

(1) Social Questions
    (a) Purpose
    (b) Privacy
    (c) Depersonalization
    (d) Cost

(2) Technical Problems
    (a) Patient Identification
    (b) Lack of Uniform Terminology
    (c) Large Data Files
    (d) Reliability and Failures
    (e) Costs of Data Transmission

In addition to the social and technological issues raised by Lindberg, there also remains the question of the network equipment configuration. Current thinking has centered around a conceptual model of a hypothetical large computer which is dedicated to numerous stations connected to it. Peripheral computers could also be placed in these networks to concentrate messages, process entry data, and switch messages. Alternative conceptual models deal with the use of medium-sized computers which could be dedicated to a single function of a subsystem; and each by a suitable transmission system, could serve all the stations. Typical functions would be: admission/discharge/census; automated patient history; interpretation of physiological signals; bloodbank management, general laboratory data transmission; diagnosis assistance; analysis of patient care; patient scheduling; and special procedures. Although the conceptual issues of such a system have been debated at length, a total operational model is far from implementation.

This section of the paper has primarily addressed the generic definitions of an MIS. The next section discusses various current, operational hospital discharge data systems.

## II. HOSPITAL DISCHARGE DATA SYSTEMS

### A. PURPOSE

On June 18-20, 1969, a Conference on Hospital Discharge Abstract Systems was held at Airlie House, Warrenton, Virginia (180). Its purpose was to explore ways for improving and coordinating health information systems in the United States. The sponsors of the Conference were The Johns Hopkins University, the National Center for Health Statistics, and the National Center for Health Services Research and Development. These organizations were fully cognizant of the fact that there was urgent need for the development of uniform health data systems that could link a variety of elements and provide an adequate basis for comparison, evaluation, planning, and policy-making.

For a host of reasons, some of which were alluded to in the previous section, hospital discharge data appeared to be the logical starting point for the development of a uniform health data system. Conceptual issues addressed the use of hospital statistics as a measure of controlling costs and monitoring the quality of care. In relation to controlling cost, it is difficult to comprehend how effective measures can be used, until it is possible to link patient care data, administrative data, and financial data, so that utilization, services, and charges can be compared within and among hospitals.

In relation to the quality of care, there has been growing concern about this area on the part of many professional groups, e.g., Regional Medical Programs, continuing medical education programs, and new peer review organizations. The concept of the hospital being a self-contained unit has shifted to that of being the focal point of health care for the community. Planning agencies as well as public and private health insurers have also been well aware of the need for better and more uniform statistics. The expanding interest and spending in health care by the Federal Government has stimulated the necessity of hospital data, e.g., Medicare and Medicaid. Legislation under the Hill-Burton and Comprehensive Health Planning Acts have placed new requirements for a variety of hospital and health related data with the growing demand for health statistics and the concurrent development of computer science. It is now possible to collect, collate, store, analyze, and distribute data on a much more elaborate and sophisticated scale.

As a result of these many factors, there has been a tremendous increase in the activity of hospital data systems. The field is embarking on a formative period of development and change, with new systems being developed and new techniques introduced. This paper will deal mainly with hospital discharge abstract systems since there is far more documentation available than for existing ambulatory record systems. Several operational ambulatory data systems will be discussed later. Hospital records have traditionally provided the "hardest" data continuously available on morbidity. These data are easier to collect and codify than those from a physician's office. Hospitalization is a measurable episode, and diagnosis and other parameters are routinely recorded.

There are limitations to collection and use of hospital data that must be taken into consideration, especially in relation to total health care information. One must remember that hospital morbidity statistics may be biased; that hospital care is only one part of the total health care setting; and, that hospital utilization rates are influenced by factors other than severity of illness, such as socio-economic level, local customs, availability of beds, convenience, and the presence or absence of financial barriers. Ideally, the ultimate expansion of a health data system should include outpatient clinics, nursing homes, physician's offices, home care programs, and other settings that encompass the total range of health services. The long-range objective should be geared to a network of integrated reporting systems covering all aspects of medical care. Hospital data, on the other hand, should be related to defined population or denominators which can maximize its value by correlating them with health services information from other sources.

This and succeeding sections of the paper are predominantly based on the results of the Airlie House Conference and attempt to provide summative abstracts of various hospital discharge data systems as well as a codification of pertinent recommendations for future implementation and use. The abstracts not only include independent non-profit data systems such as the Professional Activity Study (PAS) and federal systems such as the National Hospital Discharge Survey by the National Center for Health Statistics, but also data collected by public and private insurance agencies such as the Social Security Administration (MADOC) and the Blue Cross Association.

Of the independent non-profit systems, PAS is the largest and is the only one with a national scope. It began in 1953 and as of 1970, 1,300 hospitals in 46 states and Canada were members, which represents approximately 30 percent of the discharges from short-term general hospitals in the two countries. In addition, more than one-half of the hospitals participate in the Medical Audit Program (MAP) which was added in 1959 to aid hospital medical staffs in the evaluation of quality care. Most hospitals, other than the participants in MAP, do not record clinical data in the same detail.

The Hospital Utilization Project (HUP), QUEST of Northeast Ohio, Health Service Data of Wisconsin, Inc. (HSD-W), and the California Health Data Corporation (CHDC), are smaller, regional systems. Two recent systems also deserve mention; namely, the Utilization Information Service (UIS) of the Massachusetts Hospital Association and the Connecticut Utilization and Patient Information System (CUPIS). There are also several commercial firms such as Medi-Record, Medinet, Medi-Data, etc., that process data for hospitals on an individual, tailor-made basis. They do not presently contribute to the general pool of health information except indirectly through the relatively small number of subscribing hospitals. They are, however, a potential resource in addition to the non-profit systems for expansion of the network of reporting systems in this country.

Since the majority of American hospitals do not participate in organized data systems, the National Hospital Discharge Survey is able to provide a service by being the principal source of national statistics. Main drawbacks, however, are that the items collected by the survey are limited and the small sample size (one percent of all annual short-term hospital discharges) does not permit regional or local breakdowns.

Another source of health data is insurance claims forms. They offer the advantage of continuing vital financial information of a patient's hospital stay which is not usually available from other previously mentioned sources. They are, however, lean on medical and socio-demographic information, and since most keep claims data on a contract basis, it is extremely difficult to identify a population-at-risk. One possible exception is the Medicare program, which collects more data on patients than most private carriers and illustrates how a claims form, with some alteration, might serve as a hospital discharge abstract.

A further concern voiced at the Conference was the data requirements of various categories of users (180).

These categories include:

(1) Hospital management (internal planning, accreditation, utilization review, and legal requirements).

(2) Clinical management (medical audit, continuing medical and health professional education).

(3) Fiscal accounting (cost control, condition of third-party payers).

(4) Community planning.

(5) Epidemiologic and health services delivery research.

The following sub-sections will address the various major health data systems and their potential use.

## B. MAJOR HOSPITAL DISCHARGE ABSTRACT SYSTEMS

### 1. Professional Activity Study (238)

The Commission on Professional and Hospital Activities (CPHA) is a non-profit corporation sponsored by the American College of Physicians, American College of Surgeons, American Hospital Association, and the Southwestern Michigan Hospital Council. The Professional Activity Study (PAS) is one specific program of CPHA which was developed in 1953 under P.K. Kellogg Foundation grants. In addition to PAS, MAP, and the Length of Stay Package, the Commission also operates the Cancer Registry Information System and the Community Health Information System. The Commission also conducts research on disease and therapy classifications and on medical and health information. It collaborated with the U.S. Public Health Service on the publication of the first ICDA, its revision, and published the hospital adaptation of ICDA (H-ICDA).

The primary purpose of PAS is to provide displays of information derived from the medical records of hospital inpatients for use by hospital administrative and medical staffs of subscribing hospitals. Another purpose is to collect and maintain a computer retrieval file of accumulated PAS data which CPHA can use for its own studies. A PAS case abstract is prepared by the medical record department of each subscribing hospital for every discharge, including newborns and stillborns. The abstract also allows space for optional data which may be introduced at the hospital's discretion. The case abstracts are sent to CPHA in batches for rapid processing. Hospital participation is voluntary.

All data are processed by Honeywell digital computers with entry by punched cards. Routine tabulation and reporting to subscribing hospitals occurs in three cycles: monthly, quarterly, and semiannually. Hospitals participating in the Medical Audit Program (MAP) receive additional reports on a quarterly basis. For hospitals subscribing to the Length of Stay Package, PAS has created a model hospital of average patients similar to those actually treated. These average patients are described in a base table compiled from all short-term general hospital discharges in the U.S. who subscribe to PAS. The base table uses 200 diagnostic groupings, five age groupings, the presence or absence of secondary diagnoses, and the presence or absence of surgery. Hospitals are also provided with custom tabulations of their own data as well as inter-hospital comparisons according to their own specifications.

The data base for PAS includes:

- Patient Identification
- Social Characteristics
- Diagnoses
- Operations
- Selected Admission Findings
- Investigations (total work-up)
- Management (therapy)
- Optional Data

The PAS case abstracts are considered to be reasonably accurate reflections of the clinical records submitted. Accuracy can vary and is dependent on the case abstract item. Items such as patient identification, age, sex, physician, surgeon, admission date, discharge date, discharge status, one diagnosis and one operation, birth weight, areas of investigation and management can be readily and accurately extracted by the record abstractor. Other items, such as emergency admission, must emphasize variations in local definition.

When hospitals first begin participation in PAS, all incoming case abstracts are monitored by experienced CPHA coders. As PAS hospitals achieve mastery of completion of the form as well as the H-ICDA coding of diagnoses and operations, the monitoring is transferred to keypunch and verifier operators who also edit during this process. There are also editing routines automatically applied by the computer. There are, however, certain kinds of errors which can never be detected on a single case abstract and can only be discovered by review of statistics developed from the individual abstracts. If inconsistencies are detected by CPHA staff, they are called to the attention of the participating hospital. In addition, if a participating hospital does not maintain a low rate of coding errors which can be detected by CPHA, it is dropped from the program.

PAS has been designed to increase the accessibility of medical record information for monitoring and improving patient care. The reports generated are designed to help hospitals and medical staffs in the following areas:

- Peer review
- Practice pattern analysis
- Medical auditing
- Continuing medical staff education
- Utilization review
- Medical staff committee work
- Inter-hospital comparisons
- Medical record quality
- Medical record indices
- Base patients statistics

In an effort to maintain the accuracy and quality of case abstracting, CPHA sponsors training programs for physicians, administrators, and record room administrators of participating hospitals. The training sessions are conducted in Ann Arbor for a duration of two days each. In addition, one-day schools are conducted at strategic points throughout the country to further extend the arm of CPHA.

The major advantages and disadvantages expressed by users of the system are:

Advantages

- Simplicity of the format of a uniform case abstract.
- Continued system development and refinement, research, and educational activity.
- Large data bank of standardized information in computer-accessible form.

Disadvantages

- Clinical researches require more detail including medical history and physical findings with specific clinical laboratory and X-ray interpretations.
- Data is specific to hospitalized populations rather than community populations.
- Episodic nature of data in reporting an illness.

PAS information has been useful in studies conducted by the CPHA, independent research investigators, Regional Medical Programs, and comprehensive health planning agencies. For example, CPHA has conducted studies dealing with evaluation of medical practice, length of stay analyses, studies of methods and treatment of diagnoses, laboratory and X-ray utilization, and profiles of the management of selected groups of patients or procedures. Other studies by independent researchers include therapeutic abortions in the United States, statistical tables by hospitals and by diagnoses for a cohort of hospitals over a five-year period, and special studies identifying areas of need for physician education. Arrangements have been made with the California Health Data Corporation (CHDC) to supply raw data on magnetic tape from those hospitals in PAS desiring their data to be included in CHDC studies. PAS has assisted the National Center for Chronic Disease Control in providing a format for projecting acute myocardial infarctions on national basis. CPHA has also tabulated data on cardiovascular disease and cancer for the Community Health Service. Also, profiles of hospitalization of psychiatric patients and short-term general hospitals for pre- and post-Medicare periods were provided to the Social Security Administration.

### 2. Quality, Utilization, Effectiveness Statistically Tabulated (QUEST) Program of Northeast Ohio (160)

In 1956, the Citizens Hospital Physician Study, with 22 representatives from the public, management, labor, physicians, hospitals, and Blue Cross, was established to study hospital costs and utilization in five countries of Northeast Ohio. The purpose of the study was to examine certain data on individual inpatient discharges during a three-month period from all hospitals in the area. The study included facts on over 63,000 inpatients who received an estimated 500,000 days of care.

A committee published a 14-chapter report dealing with the many aspects of hospital operation, which has been used not only in Northeast Ohio, but throughout the country and still serves as an important planning document for the Northeast Ohio area. However, the citizens committee recognized that their report, which was limited to care during the three-month period in 1957, would soon become outdated. One of their major and most lasting recommendations was that fact-finding studies of hospital costs, hospital utilization, hospital operation, and for hospital facilities be done on a continuing basis.

After the publication of the report, four hospitals in Cleveland requested Blue Cross to make available a data processing staff and equipment for the continuous compilation of facts regarding inpatient care. Blue Cross agreed, with the condition that the four hospitals design a system of uniform data to be collected and reported. A research committee of hospital administrators and subsequently a research committee of medical records librarians were organized to spearhead and monitor the program. Two additional research committees were established in 1965; namely, physicians and hospital trustees.

The pilot program drafted by the committee of hospital administrators was implemented in one hospital during May 1958. The program justified expansion. During the test period as of July 1, 1958, the four original hospitals were participating. Since that time, the number of hospitals participating has increased to 53. This represents 97 percent of the general hospital beds and corresponding percentage of discharges in the ten counties of Northeast Ohio. In addition, the program now is processing over 30 percent of all general hospital inpatient discharges for the state.

Since 1967, this program has been known as QUEST which refers to Quality, Utilization, Effectiveness, Statistically Tabulated. The purposes of the program are:

- Provision of data for use by hospital administration and medical staff in studies of hospital utilization.

- Provision of data for review of patient care by the medical review and surgical tissue committees of the hospital.

- Provision of data for medical research.

- Provision of data for planning by CHP organizations, RMP, mental health agencies, and Neighborhood Health Centers.

- Provision of general statistical data for use by hospital administration.

- Provision of data for physician applicants to medical specialty boards.

- Provision of physician rosters by hospital staff appointment, specialty and office location as well as alphabetical rosters.

- Provision of factual data for the completion of reports to the State Health Departments, American Medical Association, American Hospital Association, and a Joint Commission for Accreditation of Hospitals.

The program originally consisted of only one part in 1958 which provided an analysis of several aspects of hospital utilization or the volumetrics of inpatient care. This part corresponded to data routinely collected by hospital medical record departments. The program improved this routine collection function by implementing a fact sheet or abstract form which was transmitted to Blue Cross and served as the basis for the reports produced by the computer. Part II was instituted in 1963 and consisted of an analysis of inpatient discharges by diagnosis and by surgical operations. ICDA codes are used in compiling the diagnostic and surgical indices. Of the 53 hospitals participating in Part I, there are 51 participating in Part II.

In July 1967, the Research Committee of Physicians developed Part III which is designed to assist medical staff interested in reviewing the quality of inpatient care. The Part III report is furnished to the hospitals for use by the medical review committee which lists patient discharges by diagnosis together with surgical operations performed and a record of certain clinical findings and the diagnostic and therapeutic procedures instituted. A corresponding report is furnished with listings by attending physician. The Regional Medical Program of Northeast Ohio and its committees on heart, cancer, and resporatory diseases also expressed interested in the development of profiles by ICDA diagnostic code. These profiles were subsequently furnished to medical review committees of hospitals for assistance in reviewing records in Part III of the QUEST program.

The abstract forms are completed by the hospital medical records department for each discharged patient. The time requirement to complete the abstract is estimated at two minutes for Part I, two minutes for Part II, and three minutes for Part III. It is assumed that there is a substantial savings of time over what is required to record the data manually and additional time savings through the use of electronic data processing for the tabulation of the data.

Reports are furnished monthly, bi-monthly, and annually to participating hospitals. A description of the reports follows.

Monthly Reports

- *Discharge Journal*

  This report lists all patients discharged by the hospital from a specific month and serves a number of purposes. It serves as a control log of the number of inpatient discharges with patients listed chronologically by day of discharge and within day of discharge by patient number. All the discharge data on each abstract sheet are listed for each patient. Totals for each day are shown on the number of patients discharged, the number of newborn, and the number of other than newborn, the total number of patient days for patient discharge, and the number of consultations for discharged patients. There are also monthly totals of patients by race and by religion included in the discharge journal together with monthly totals for the same items as daily totals. The number of cases and days in the current six-month period or any prior period are also included in this report. These figures are shown for newborn, Medicare, and total days and cases, and apply to cases discharged on a specific month for which the discharge journal is produced.

- *Financial Classification*

  This report tabulates the number of patients and patient days by financial classification and mode of payment whether self-pay or third-party. There are separate totals for both patients and days of care for newborn, adult, and children and total.

- *Postal Zone of Geographic Area*

  This listing shows a tabulation of the number of patients and days of care by postal zone and other areas of the patient's home address.

- *Discharge Analysis by Service*

  This is a tabulation of the number of patients by discharge service (medicine, surgery, obstetrics, newborn, etc.). The number of male and female patients by medical service in each of the three broad age groups (13 years and under, 14 to 64 years, 65 years and older) is also shown in this report. Patient days by service for each of the three age groups are also listed in this report. Patient deaths are also listed and are tabulated by the number who died within 48 hours of admission or after, and by the number within these categories who did not undergo a post-mortum examination. Consultations for patients in each discharge service are also tabulated.

- *Physicians Index*

  This index is a tabulation by attending physician of the number of patients he attended and were discharged during the reporting month. The total number of patient days and the number of patients who died are also shown by attending physician. The number of patient days, the discharge status (alive or expired), patient number, the discharge date, the financial class, and postal zone or area of home address are shown individually for each patient. Information is included in this report on the number of patients and patient days for cases which stayed two days or less or thirty days or more.

- *Consulting Physicians' Index*

  This report shows those cases on which a written consultation was done by each physician. The total number of such consultations given by each physician in relation to patients discharged during the month are listed. Data on individual patients are similar to those in the physician index. The only exceptions are the replacements of the number of patient days and the discharge status by the service requesting and the service giving the consultation.

- *Service Requesting Consultation*

  This report tabulates the number of consultations requested by each service and within each requesting service, it lists the number of consultations given by each service.

- *Service Giving Consultations*

  This provides a tabulation of the number of consultations given by each service to all other services.

Bi-Monthly Reports

- *Diagnostic Index*

  This report lists in order by ICDA code each case which has received care at a particular hospital for a specific period. It serves as a cross-index since cases are listed under each diagnostic code which apply to the case. A total is given for each diagnosis for the number of cases by primary diagnosis and the number of days of care for these cases. Totals are shown for all cases whether evidenced by a primary or secondary diagnosis. Indices are cumulative up to a year with supplement indices provided for late reported cases. Each case has the following items listed: applicable diagnostic codes, patient number, discharge date, sex and race, age, attending physician, discharge status, number of days stay, financial class, all applicable operation codes and surgeons who performed operations.

- *Operations Index*

  This report is similar to the diagnostic index and reports the number of surgical operations by ICDA code. Cases are listed individually by surgical operation code, and are cumulative for a calendar year.

- *Patient Care Report*

  This report is generated for the use by medical review and utilization review committees of the hospital medical staffs. Patients are listed by diagnostic index with additional data on admitting diagnosis, the primary surgical operation, admission findings, laboratory findings, type of X-ray service performed, blood therapy, and any other therapy.

- *Patient Care Report*

  This report is basically the same as the patient care report except that the listing is by attending physician.

### Annual Reports

Annual summaries by diagnosis, surgical operation, geographic area, financial class, medical service, and attending physician are generated for each hospital. Consideration has been given to extending QUEST to include outpatients, patients and extended care facilities, and nursing homes and home care patients. It is important to note that this reflects the growth of hospital outpatient services and hospital affiliation with extended care facilities, nursing homes and home care programs and the continuing importance of monitoring the continuity of care rendered to patients.

### Quarterly Cost Reports

During the past several years, QUEST has inaugurated a program of cost analysis and comparison. It was decided to establish a quarterly comparison of the cost of all hospitals in Northeast Ohio within six groups cateogrized by geographic location and size. Cost comparisons are made on the basis of the AHA classification of expense accounts and costs are codified into five categories: inpatient costs, outpatient clinic costs, emergency room costs, ambulatory surgery, and referred ambulatory patient costs.

Detailed analyses of quarterly hospital costs can aid in the development of incentive hospital reimbursement. While present incentive factors in the reimbursement formula are based on gross cost of all hospitals, these quarterly cost analyses make it possible to determine the advisability of a separate formula for each of the six groups of hospitals and five categories of patients. It also allows comparison of functional costs within the hospitals to gross per capita per diem costs.

The major overriding success factor of the QUEST program is that it has resulted from major cooperation of hospitals and physicians. This regional cooperative computer program has several advantages:

- Permits local comparison of hospitals of similar nature when these hospitals agree to participate.
- Permits maximum control of input into the system because of hospital proximity to a cooperative computer system.
- Permits flexibility within the system.
- Permits analysis of the volumetrics of care for a denominator population.

Since the QUEST system is designed to permit expansion, it may be possible to include:

- Health data on ambulatory patients, nursing home patients, and home care patients.
- Admission data and financial data with emphasis on patient account data.

QUEST also has definite advantages for the provider. They include:

- Design to eliminate duplication of hospital records.
- Regional cooperation eliminates duplication in cost of manpower and hardware inherent in individual hospital systems.
- Permits small hospitals to join in an automated data processing program.
- Permits maximum use of the central dedicated computer.

The medical profession in Northeast Ohio has been the major beneficiary of QUEST. Through computer technology, it has facilitated the work load of physicians in utilization studies, quality of care studies, and medical research. It has also assisted hospital administrators in analyzing their operations. A major advantage of the QUEST program is that it has been developed in such a way that it can permit and will permit compatibility of certain basic data with other regional systems, with state systems, or with a national system. It will assist health planning agencies in presenting facts regarding present patterns in the diagnosis and treatment of disease, on services rendered in the hospital, extended care facility, nursing home, home care agencies, and the costs related to these services.

### 3. The Hospital Utilization Project (HUP) of Western Pennsylvania (153)

Since HUP's establishment in 1963, it has been headquartered in Pittsburgh, Pennsylvania, and has operated as a volunteer, non-profit organization co-sponsored by the Allegheny County Medical Society Foundation and the Hospital Council of Western Pennsylvania. HUP was organized to help resolve the problems encountered by Western Pennsylvania hospital utilization committees. Its methodology was designed to provide assistance to these committees, via computerized information on all discharged inpatients, and by personel staff assistance in the interpretation and evaluation of the data.

The pilot project began in 1963 with 14 general hospitals in the four-county area of Western Pennsylvania, which comprises the Tenth Councilor District of the Pennsylvania Medical Society. When the enrollment of hospitals increased to 33 by 1966 it was then decided to extend the HUP service to any accredited hospital in Western Pennsylvania, and subsequently to all accredited hospitals in Pennsylvania and bordering states. There has been a gradual growth to a present enrollment of over 120 hospitals in Pennsylvania, New York, New Jersey, and West Virginia.

In the late 1960's, it was recognized that hospital administrators and medical staffs needed more refined data for management, planning, utilization review, and medical care appraisal. Accordingly, in 1968, it was decided to undertake extensive re-programming of the HUP system with revision of data collection documents and additions and improvements to the reports generated. In addition, a major extension of HUP data collection began in 1967 after the implementation of Medicare, when the requirements for utilization review became applicable to extended care facilities. It was recognized by the leaders of the Tenth Councilor District that, in most cases, ECF's lacked any formal medical staff structure. A central review plan was sponsored by the Medical Society and by Blue Cross of Western Pennsylvania to perform utilization review for any facility not having its own formal committee. HUP was asked to develop a tailored medical abstract for this purpose, as well as for data collection and reporting. At present, there are over 35 facilities using the central review plan and there are over 15 others using the approved methods of review who submit medical abstracts routinely to HUP for analysis and compilation of comparative and illustrative data.

The HUP system for hospitals was designed to provide medical staffs with readily available, understandable and meaningful data for utilization review and medical care appraisal. Need for this assistance became apparent from the problems encountered with case review by the early utilization committees which were functioning in Western Pennsylvania in 1963.

Early reviews were largely directed to the study of inpatients with a predetermined length of stay of 21 or 30 days; to cases designated as questionable by third-party payers; or to samples of varying size, randomly selected from monthly discharges. These efforts were considered to be policing actions and physicians were critical of the amount of time spent on unproductive reviews.

HUP, therefore, was initially designed to develop a uniform, mechanized approach to assembling necessary data for a utilization committee. Emphasis was placed on providing a screening mechanism to select cases for productive review and analysis. After a series of refinements and improvements, HUP placed emphasis on the flexibility and individuality in retrieval and use of data. It is designed to meet the informational needs of individual hospitals upon request, with special emphasis on the generation of special, tailor-made reports.

The HUP approach is essentially simple and involves a series of automated steps that focus on specific areas of hospital practice:

- Medical record abstracting of forms suitable for electronic data processing.
- Control of accuracy and completeness of abstracted data.
- Compilation of data and generation of a series of monthly, quarterly, and semi-annual reports.
- Summary comparative experience for specific major disease and operation categories.
- Development of hospital profiles by comparative experience in a number of diagnostic categories.
- Maintenance of a library of special administrative and statistical reports.
- Optional input or special studies of administrative and professional practices.
- Automation of medical care appraisal and specific areas of abnormal experience.

The basic HUP program offers a pattern review technique, where data on all discharged patients are collected and permits analysis of hospital utilization by major specific diagnostic category, for the purpose of drawing attention to practices that may be modified for groups of patients. Simple average length of stay tables and hospital profiles allow the utilization review committee to focus on a series of cases where review might be productive. This permits thorough committee evaluation of individual cases, identification of valid medical reasons from variance from community experience, and highlights extraordinary medical practice that might require attention. In addition, detailed analysis of individual cases, guided by accepted criteria, provides an in-depth medical care appraisal technique.

Much of the HUP data collection techniques have been derived from the experience of others; namely, PAS. As with PAS, the process begins in the hospital medical record department, where the medical record abstract is completed for every discharged inpatient. Most of the entries on the revised HUP abstract are available from the facesheet of the patient's chart, to lessen the need for interpretation by a clerical abstractor. It is estimated the abstract can be completed within five minutes, depending on the complexity of the case and the form of the hospital's facesheet. Since the abstracted data becomes the basis for all reports, time and accuracy are the two items of prime importance.

To insure confidentiality, the hospital, patient, physician identifications are recorded in code form. Code numbers are provided by HUP. Diagnoses and surgical procedures are coded in ICDA-8 and are written out in standard nomenclature as well, to aid HUP personnel in the detection and correction of errors. As with PAS, HUP provides continuing instruction in ICDA coding, in both individual and group sessions.

The case abstract is usually prepared in duplicate, as soon as practical after discharge, and completed by the medical record clerk as the patient's record is closed out before filing. Carbon copies are retained by the hospital, until the monthly listings are returned and are checked for possible errors. Originals of completed abstracts are submitted to HUP on a monthly basis and are forwarded to HUP quality controllers in batches of 100 for error-checks.

The original reports emerging from HUP processing were of two basic types:

(a) Those useful in utilization review, and

(b) Those which could replace hand-prepared indexes and tabulations in the hospital/medical record department.

HUP has revised this original program and the basic reports have been supplemented by periodic and operational reports of medical audit and quality of care data and by the creation of a library of special reports that can readily be modified and retrieved according to the information needs of the user. The routine reports are as follows:

Monthly Reports

- *Discharge Analysis*

  This report provides a service-by-service analysis of total cases, days of stay, age and sex distribution, emergency admissions, death, consultation, pay status, etc. In addition, it provides a summary and analysis by percentage of transfers, death rate, autopsy rate, and consultation rate, as well as analysis by day of the week of admission and discharge. It does not include diagnoses or operative procedures. Therefore, a sub-routine has been developed, utilizing a half-sheet overlay of the abstract that can be completed on discharge without waiting for completion of the patient's record. This provides an advanced discharge analysis, which can be returned to the hospital shortly after the end of the reporting month.

- *Diagnosis, Operation and Death Listings*

  These reports are optional to the participating hospitals. In the diagnosis listing, all patients having the same primary diagnosis are listed as a group, sequentially by length of stay. In the operations listing, all patients having the same operative procedure are listed together, sequentially, by post-operative days of stay. The death listing is for those patients who died during the discharge month.

Periodic Scheduled Reports

Two specific reports are provided:

- Length of stay comparison, and
- Quality of care comparison.

The length of stay comparison report is based on the discharge month with a hospital-to-hospital comparison for the average length of stay by broad service groupings. The quality of care comparison report compares similar hospitals on a monthly basis by selected quality of care indicators, including gross death rate, net death rate, autopsy rate, post-operative death rate, consultation rate and transfer rate.

Semi-Annual Reports

Semi-annual reports are generated to supply a diagnosis index, operations index, complete physician, surgeon, and consultant listings, and a summary of monthly discharge analysis data. These reports include:

- *Diagnosis Index and Operation Index*

  The appropriate patient data is listed under each of the diagnoses or operations which have been recorded. If the patient had three diagnoses, it will appear on the index three times, once under each diagnosis. The index is designed so that all cases where the applicable diagnosis or operation was primary, appears first, followed by a detailed analysis.

- *Physician, Surgeon and Consultant Listings*

  These reports list for each physician, all cases for whom he was reported as either attending surgeon, or consultant.

- *Discharge Summary*

  This is a simple six-month summary of data shown on the monthly discharge analyses.

Statistical Reports

These reports are prepared from the semi-annual disease indexes and are simple tables of the average length of stay for the more common diagnoses and operative procedures for which hospitalization was required. Since most practicing physicians are unfamiliar with statistics, HUP uses the mean as the value to be recorded, since it is a familiar term and one whose use requires no explanation. Reports are prepared for some 20 diagnostic categories and are distributed periodically in a sequence designed to rotate interests among the various services. Uniform definitions are used to select cases from the semi-annual indexes that are used in the preparation of statistical tables. In addition, separate reports are prepared for groups of hospitals according to size, staffing, services and setting. The names of the hospitals appear in these reports, permitting each hospital to evaluate its experience against others, which are considered to be comparable.

Hospital Profile

By combining the data from the statistical reports, HUP semi-annually constructs three simple bar-graph profiles for each hospital; one each for medical-surgical, obstetric-gynecologic, and specialty diagnoses, displaying the hospital's relative length-of-stay rank for each diagnosis among a group of comparable hospitals.

Special Reports

One of the more important aspects of HUP is the ability to generate any one of the series of special reports at the request of an individual hospital. The HUP library consists of approximately 25 report formats which the hospital can request simply by specifying the parameters.

It was intended that the basic HUP program would be used as a screening device to draw attention to patterns of care, rather than attempting to identify individual deviant cases. The comparative statistical hospital profiles provide a parallel series of cases from similar medical sources against which the hospital's length of stay experience can be evaluated. Although experience differing from comparable hospitals is not necessarily wrong, it might suggest to a medical staff that a study of a series of cases might be worthwhile.

HUP also provides the medical staff committee with detailed individual case review worksheets to be used to focus on specific disease categories. As an aid to the reviewing physicians HUP has prepared a criteria manual, containing guidelines for quality of care in some 70 major diagnoses. Although the criteria are neither rigid nor inflexible, the attempt is to establish norms of what is considered to be good medical care. Evaluation of completed worksheets permits identification of valid medical reasons for variance and highlights extraordinary medical factors that might require attention. The detailed analysis of individual cases guided by such criteria provides an in-depth appraisal of the quality of care provided. HUP also offers additional help in medical care appraisal by the generation of periodic quality of care analyses and by offering the opportunity of optional reporting of medical audit items of special interest to a medical staff.

The ongoing review of HUP data on hospital use acts as a primary educational experience for medical staff committee members. Committee findings and evaluations based on these data provide valuable factual information for medical staff discussions, clinical conferences, resident training, and other in-hospital continuing education programs.

HUP data provides a valuable resource not only for internal medical staff use, but also for demographic and epidemiologic studies on a local or regional basis. Such studies might include incidence of acute coronary occlusion or an analysis of rehabilitation potential. HUP has also assisted the Western Pennsylvania Regional Medical Program in refining education and training needs for its 28-county area.

HUP was designed to take advantage of what may be termed provincialism. It was considered far more effective to focus comparisons on data generated from within the region rather than with some geographically remote area. Practical experience has demonstrated that effective application of statistical data is enhanced by central staff assistance. Since HUP is limited to a region, its staff is able to provide such direct personal assistance in the interpretation of data and design of special studies. However, certain valid questions can be raised concerning the basic system, especially the decision to adopt the mean as the standard of comparison. A continuing limitation is the number of diagnostic categories suitable for comparative analysis, since there are few reasons for hospitalization that occur in pure form and sufficient numbers in an average hospital in a limited period of time. HUP's successes do not rest solely on the fact that they have an efficient and sophisticated information system, but primarily on the fact that hospital and medical staffs have been willing to use the data resources available and are able to translate the data into meaningful and relevant information.

### 4. Health Service Data (HSD-W) of Wisconsin, Inc. (225)

HSD-W began in 1966 to provide a locally operated system of analysis of hospital discharges. It was originally conceived by a community group representing hospitals, the medical profession, labor, industry, and the health insurers of the Milwaukee area who became known as the Milwaukee Medical Resources Study Committee. Its original purpose was to provide assistance to utilization review committees of hospitals of the state in identifying problem areas for intensive review and action. Of the available health data systems operating in the country which could be used as models, HUP was selected for a number of reasons.

Shindell (225) claims that the basic test of any health data collection organization should start with the objective to be gained by analysis of the data to be collected. Once the objective is clear, then the issue of the practicality of obtaining the data desired and possible by-products of the data collection technique must be considered. Shindell has identified a series of objectives dealing with hospital discharge systems:

- Supply of data for various review mechanisms, e.g. audit, death review, and utilization review.
- Supply of data for both clinical and epidemiologic research.
- Preparation of indexes required by JCAH.
- Supply of data for specific accreditation purposes, e.g., residency training programs.
- Obtaining data for overall analysis of hospital activity for internal and external planning.

Shindell goes on to state that when HUP started, its specific objective was to serve utilization committees. The plan, as it evolved, attempted to include, as concomitant services to participating hospitals, data which would serve as many additional objectives as might be attainable on a practical basis. In contrast, he claims, the month when CPHA was established, its primary concern appeared to be medical audit, and its extension into utilization review was relatively late in developing. He also feels that the QUEST program in Ohio began on a simpler level and was then modified and expanded in response to local desires. Therefore, HUP was selected as the model for Wisconsin since the basic desire of HSD-W was to remain as simple as possible, providing a basic service that most nearly reflected the common denominator of priority objectives and offering optimal reports to meet the specific needs. In addition, the scope of HSD-W data could be expanded as demand developed.

The basic HSD-W abstract form and report is very similar to HUP. HSD-W has made two modifications in the abstract: allowance for a hospital code designed to reflect size, location and type of ownership; and allocation of space for reporting the patient's zip code. After HSD-W began, it was determined that community agencies wanted different age breakdowns and identification of census tracts. HSD-W was able to satisfactorily comply with the required age breakdown, but decided not to use census tract because of the time required in coding to determine patient's home residence by census tract. It was felt that zip codes were satisfactory and that if necessary for study purposes, census track distribution could be estimated from zip codes.

The philosophy of HSD-W is that the principal motivation for fostering and developing abstract systems in most communities is the expectation that the use of the system will improve the effectiveness of the hospital as a resource, either in adjusting length of stay to an optimal level, reducing or eliminating unnecessary admissions or in processing data for long-range planning in regard to the amount and type of services needed in the future. HSD-W postulates that there has been relatively little use of the data from routine abstracting systems for the last stated purposes, but the availability of such data as a by-product of the more immediate goal of limiting current hospital use has been recognized. Therefore, HSD-W feels that relatively little data needs to be collected on a repetitive basis. Recognizing the time and expense involved in record abstracting, HSD-W restricts the collection of data to that which is considered essential.

Attached is a table prepared by HSD-W which summarizes the data content of the three principal types of data collection systems as analyzed from the published reports of sponsors. The major differences among the several systems are largely the amount and type of clinical laboratory studies that are reported. HUP and HSD-W collect the minimum amount of clinical data on the patient and are the general prototype for some of the new systems which have been introduced by several Blue Cross plans. PAS-MAP collects considerably more data for evaluation of patient care as does the QUEST system. The California Health Data Corporation ($MR_1$) illustrates the admission-separation type of data system; introduces several new features and can be seen as a compromise between the first two types of systems in that it reports a selected number of items designed to assist in the medical audit.

## COMPARISON OF DATA COLLECTED BY THREE TYPES OF SYSTEMS*

| | HUP and HSD-W | PAS-MAP | $MR_1$ (California) |
|---|---|---|---|
| Patient Identification and Characteristics | | | |
| Medical record number | x | x | x |
| Name | — | — | x** |
| Residence | x (HSD-W) | — | zip code or |
| | zip code | — | county code** |
| Age | x | x | birth date |
| Sex | x | x | x |
| Race/origin | x | x | x** |
| Religion | — | — | x** |
| Marital status | x | — | — |
| Record of readmission | — | — | x** |
| Administrative and financial data | | | |
| Hospital code | x | x | x |
| Class of admission | x | x | x |
| Source of referral | x (HUP) | — | x |
| Admission and discharge dates | x | x | x |
| Hour of admission | x | — | — |
| Hospital service(s) | x | x | x |
| Type of accommodation at discharge | x | — | — |
| Time elapsed before (or date of) surgery | x | x | x |
| Referral to committee/special case | — | x | x |
| Admitting physician | — | — | x** |
| Attending physician | x | x | x |
| Consulting physician(s) | x | x | x |
| Source of payment | x | x | x |
| Total bill | — | — | x** |

## COMPARISON OF DATA COLLECTED BY THREE TYPES OF SYSTEMS* (Continued)

| | HUP and HSD-W | PAS-MAP | $MR_1$ (California) |
|---|---|---|---|
| Clinical data | | | |
| Admission diagnosis | – | – | x** |
| Primary and other diagnoses | x | x | x |
| Principal and other surgical procedures | x | x | x |
| Tissue report | – | x | – |
| Anesthesia | – | x | – |
| Total number of consultations | x | x | x |
| Findings of admission investigation (hemoglobin, temperature, BP, urinalysis, WBC) | – | x | – |
| Check lists of examinations, laboratory, x-ray, and function tests performed | – | x | –*** |
| Check list of drugs administered by major categories | – | x | – |
| Other therapy | – | x | transfusions only |
| Occupancy of special care units | x (HUP) | x | – |
| Presence of hospital-acquired infections and other complications | – | x | x |
| Discharge status and destination (including type of death and autopsy) | x | x | x |

*Based on 1969 case abstracts; not included are data on obstetrical cases and unidentified special studies and options, for which space is provided by all three types of systems (225).

**Optional items.

***Space provided to record "no minimum lab or x-ray".

It is the philosophy of the simpler health data systems like HSD-W and HUP that once the basic data are collected and used to reflect overall patterns of care, sufficient information to serve as the screening function has been obtained. Sufficient data are also available to serve as the basis for specially designed studies. If individual case analyses are required, it should be directed towards an apparent problem and should resort to examination of the full medical record to be meaningful. The reports generated by HSD-W are as follows (96):

Monthly Reports

- Diagnosis listing
- Y-Codes listing, procedure listing, death listing, discharge analysis, physician activity

Periodic Reports (Quarterly, Semi-annually)

- Diagnosis index
- Procedure index
- Profile studies

Special Reports and Studies on Request

HSD feels that the common denominator of a basic health data system – practical for the small hospital and usable by a large medical center – seems to be a suitable compromise. Optional studies utilizing basic data in response to the needs of the particular participant, is achievable with this system.

### 5. The California Health Information for Planning Service (CHIPS) Demonstration Project (156)

The CHIPS Demonstration Project operated from June 15, 1965 through May 31, 1968. The objective of the project was to test various parts of an information system for health planning, including a hospital discharge abstract system called the Hospital Administrative Planning Data Processing Service (HAPDaPS). The project was also concerned with the need to coordinate data for many hospital abstract systems and other information systems pertinent to health planning. HAPDaPS was strongly influenced by the overall CHIPS concept although it was entirely capable of operating independently of CHIPS.

CHIPS was intended to simplify the collection and storage and use of data related to health planning. It recognized that numerous voluntary and public groups were interested in the same information for decision-making purposes. The approach taken was that basic suppliers of information are also primary users who can identify the information needed for the decisions, approve the forms used for collecting data, and specify the manner in which data would be reported back to them. The CHIPS concept in turn recognized that each user generates information of interest to others and that significant data could be generated by non-users of the system.

The CHIPS system was designed to take advantage of all pertinent information available and used an integrated file structure to enter the data in sufficient detail to allow computer programs to assemble the data into reports devised by system users. The availability of planning data under the CHIPS system was linked to the development of four categories of information, organized into computer files to allow for retrieval and maintenance of information. These categories were:

- Institution-referenced data file, which included facts and figures on the operations of institutions, including patient utilization.
- Standards-referenced data file, which included data on standards for licensing institutions.
- Geographic-referenced data file, which included data on population, geographic divisions, and locations and transportation networks.
- Personnel-referenced data file, which included data on identification, credentials, employment, and related material for professional and technical personnel.

HAPDaPS, the hospital abstract portion of CHIPS, was developed to ascertain whether it could provide detailed utilization data indexed for use by administrative and medical personnel and economically generate the data needed for areawide health planning. CHIPS concentrated the data collection within three representative Santa Clara county hospitals of 596 beds, 227 beds, and 48 beds, respectively. The CHIPS staff adopted certain standards for review of how case abstract systems measure up to a hospital's needs, which included:

- Cost
- Timeliness

- Format
- Use of work simplification principles
- Use of data processing principles
- Accuracy and validity

Two forms were used for gathering utilization data from the three hospitals; namely, the CHIPS patient-case abstract and the daily discharge and service transfer list. For each data item included, an expected user was identified; either a hospital or a planning agency.

In designing and programming the HAPDaPS system, the principle of gathering data as a by-product of routine daily operations of the health care facility was adhered to. To an extent, however, this principle was modified by the fact that the HAPDaPS project was a demonstration, as opposed to an ongoing system. Given these circumstances, it was not feasible to design the input procedures and forms to replace existing systems within the hospitals. This would have been desirable if CHIPS were an ongoing system.

Information collected on the patient case abstract was oriented towards hospital operation and planning. It did not include detailed data on the patient's medical treatment, but did cover some of the requirements of the JCAH. It also made provision for certain information, such as census tract of the patient, which was not usually included in abstracts used by other systems. Twelve monthly reports were designed in conjunction with the three participating hospitals. To insure promptness and maximum utility of output reports, the system was designed to produce output reports in two phases:

Management Reports

- Summary information on patient care activities
- Patient days by service and licensed bed categories
- Monthly utilization by licensed service

Patient-Related Reports

- Summary information on patients discharged, excluding newborns
- Summary information on discharged newborn patients only

- Operations and treatments
- Summary by length of stay
- Operation and treatment summary by age and sex
- Diagnosis and treatment summary by length of stay
- Diagnosis and treatment summary by age and sex
- Diagnosis index report
- Operation index report
- Physician's index report

The diagnosis and operation report lists the 25 most frequent diagnoses and operations for the individual hospital each month. The management report series was designed to return needed administrative data to the hospital as quickly as possible, following the close of the month. The remaining reports, which relate primarily to discharge and medical practice, were designed to be returned to the facility as soon as possible, recognizing that this information relied upon completion of the medical record as abstracted by the medical records department and was subject to somewhat longer delay than admission data.

Although the institutions participating were limited in number, this demonstration showed the feasibility of operating a service based on a two-part patient abstract. The activity was a logical precursor to a system more appropriate for changing requirements of hospitals: a system able to combine and supply both billing and patient care information within the time limitations required by specific functions.

An ongoing HAPDaPS system would have several advantages over the demonstration system. CHIPS admission information could be gathered as part of the routine admission procedure, which would be done by making input documents into a facesheet within the patient's medical record, which would be completed during the admission procedure. All physician numbers would be conceivably a part of some state-wide numbering system, such as license number. Census tract number and county code could be assigned by computer using programs developed by transportation planning groups and the Bureau of Census. It would not be necessary to code all admissions by census tract on a routine basis to meet the reporting needs of hospitals.

The management reports were described as being well received, since they organized pertinent material into a usable, convenient form for administrators. The two-part abstract approach coupled with the daily report on changes in the patient's status also proved to be most valuable. HAPDaPS did, however, lack cross-data for billing and therefore, was not picked up by any of the three hospitals, although computer programs were available at nominal cost.

The major portion of the CHIPS effort was the development of reports for health planning purposes. HAPDaPS and equivalent systems were seen as the source of patient utilization data required from institutions. During the demonstration, planning agency representatives worked with representatives of state-wide professional organizations and the CHIPS staff to develop five areawide planning reports:

- Bed Status Summary by Institution, Class, and Licensed Service.
- Utilization Summary by Institution and Service.
- All Hospitals or Selected Hospitals within a Given Area.
- Patient Travel Time Analysis – Admissions Only.
- Hospital Site Evaluation – Site "A" Travel Time From This Site.

From these reports, data would be required from more than one institution as well as from non-health field sources, and there were major problems in coordination and confidentiality.

It was determined during the CHIPS demonstration that desired planning data could be integrated and obtained through an independent, non-profit corporation. The primary function of such a corporation would be to provide a mechanism for exchanging health information. As a consequence, the California Hospital Association and the California Medical Association took the lead in forming such a corporation known as the California Health Data Corporation.

In addition, the projected health planning information exchange was viewed as both a mechanism to facilitate the exchange of information and as a buffer to assure a high degree of confidentiality for the participants. It was viewed to have the capability of linking up with other planning systems.

The exchange was not seen so much as a data bank for information on specific individuals, but rather as a mechanism for acquiring summary data, as a by-product of the operations of institutions and agencies, and for storing the data in computer processable form. The information stored could be keyed to census tracts. These data bases could include such things as information on utilization health facilities and services, environmental health factors, as well as demographic data classified by census tracts.

The experience of CHIPS demonstrated that if a coordinated system of hospital reporting in the United States were to succeed, the following conditions must be met:

- Suppliers of the data get valuable feedback.
- Data are handled by a neutral group.
- Suppliers of data have a representation in the neutral group.
- The individual is not identified but data can be manipulated on an individual basis.
- The system is prepared to accept tapes from facilities that have their own computer and do not use abstract forms.
- The system must have a high level of participation in order to be valuable for social planning.
- The system must relate to geographic areas so that it can be used in conjunction with environmental and socio-economic data, since health planning data are not limited to accounts of diagnoses.

### 6. $MR_1$ – The Medical Record System of the California Health Data Corporation (CHDC) (148)

The California Health Data Corporation (CHDC) is a non-profit, private organization founded in October, 1967 by the California Hospital Association and the California Medical Association. Two motivating forces brought CHDC into existence and determined its objectives:

(a) The first factor was the CHIPS demonstration project of the California State Department of Public Health. One of the significant contributions of CHIPS was to give representatives of hospitals and the medical community the opportunity to become involved in specifying informational needs for health planning. The CHIPS project alerted the voluntary sector to the importance of data systems that would yield a greater magnitude of information about health care and brought new realism to the issues of who would operate such systems and for what purposes.

(b) The second factor stemmed from the fact that hospital leaders were finding themselves in negotiation situations in which necessary data were lacking. This stark realization came about when they attempted to work with federal officials on the terms with which Medicare would be implemented. While federal officials had reams of statistics, the representative hospitals virtually had none. As a consequence of these early Medicare sessions, it was determined by the California hospital leaders that data would have to be available to verify what their practical experience showed. In essence, the final stages of the CHIPS demonstration project became the beginnings of the California Health Data Corporation.

The objective of the state-wide medical record system in California preceded any commitment to the kind of organization that would operate the system. Two years before CHDC was incorporated, negotiations had begun with CPHA. The hope was that PAS would operate out of a local center serve as the foundation for a health data center in California. This idea did not come to fruition. Representatives from CHA and CMA investigated this and other alternatives during the two-year period before the formal organization of CHDC. At the time CHDC was incorporated, the following options remained:

- An entirely new system
- PAS
- The CHIPS system
- Medi-Record

Medi-Record was finally chosen because it brought an operating system of proven value, all the technical staff needed for maintenance and expansion of the system, and a certain amount of revenue. The contract with Pennsylvania Tabulating Service (PenTab), the service bureau for Medi-Record, was made in April, 1968 and was followed by two activities:

- Promotion of Medi-Record to California hospitals
- Designing an improved system to replace Medi-Record

By the end of 1968, 135 hospitals were participating and were willing to replace Medi-Record with $MR_1$.

In itself, $MR_1$ represents no significant advance over other existing medical record information systems, either conceptually or technologically. It was intended to incorporate data which was of established value for hospitals as well as to use well established data processing procedures. $MR_1$ had the following characteristics:

- *Patient and Physician Identification*

  Room was allowed for Social Security numbers as patient identifiers. Patient name can be recorded on the abstract and is used for convenience and computer printed indexes rather than for unique identification of individuals. Physician identification is by number on the case abstract but the hospital also must submit a roster of physician names. The names can be included on the computer printed reports. The Board of Directors of CHDC established a policy that when data are transferred from the operational $MR_1$ to permanent CHDC files, physician and patient names will be eliminated. Consequently, either the design of $MR_1$ or the policy under which it is operated is suitable for a registry-type system.

- *Service*

  $MR_1$ found it impossible to come up with an extended list of service categories that would satisfy all hospitals. Consequently, up to 99 service categories of the hospital's own specification, including how these services were to be grouped, in the categories of pediatrics, medicine, surgery, etc., were provided. Also provided were up to 10 subdivisions within these services.

- *Optional Items*

  The following items were optional:

  –Patient name
  –Zip code
  –Company code
  –Race
  –Religion
  –Admitting physician
  –Admitting diagnosis
  –Total bill

- *Diagnosis and Operation Codes*

  Under $MR_1$ the hospital may use either ICDA-8 or CPHA's H-ICDA. Even though a case abstract permits up to 13 diagnoses and 14 operations, there were medical record librarians who were concerned about having any finite limit to the number that can be recorded. Thus, $MR_1$ has the capability to accept supplementary case abstracts with more diagnoses and operations.

The data base of $MR_1$ consists of the following:

- Patient identification and social characteristics
- Diagnosis and procedure information
- Planning data
- Minimal financial data (total charges)
- Availability of optional data

$MR_1$ produces the following reports on a monthly and semi-annual basis:

- Discharge analysis by service
- Discharge analysis by payment
- Discharge analysis by diagnosis
- Diagnosis index
- Operation index
- Physician and surgeon index
- Special audit listing (Monthly only)

$MR_1$ was viewed as a fundamental system to which supplementary modules with more sophisticated input/output capability could be added. They were:

- $MR_2$ – a system that would incorporate the ideas of the CHIPS and HAPDaPS systems.

- $MR_3$ – a system that would present data for medical auditing.
- $MR_4$ – an information retrieval system.

$MR_1$ can provide the statistics and indices that are essential to a hospital's medical record department. Therefore, it was reasonable to assume that $MR_1$ had the quantity and quality of utilization data at least equal to that of the manually produced information it replaced. The real test of $MR_1$ was considered to be how it would be used as a data resource by agencies outside the hospital. It has been used by the Regional Medical Program, the Hospital Council of Northern California, the California Society of Internal Medicine, and the State Health Department.

A planned objective of $MR_1$ was to acquire data on every hospitalization in short-term general hospitals in California. The simplest way to achieve that objective would be to have each of the 600 or so hospitals in California join $MR_1$, but this was considered to be completely unrealistic. There will always be a significant number of hospitals for which an alternative method of operating medical records procedures is more palatable. The following are three classes of other medical records systems that were considered to be competitive but had chances being assimulated them into the overall data gathering objectives of $MR_1$:

- Commercial systems
- Hospital-designed systems
- PAS

Another problem area that has plagued $MR_1$ is the classification of diseases and operations. This is considered to be a prime example of the difficulty at arriving at a uniform acceptable classification and definition of data. The revisions of the ICDA and the development of H-ICDA by CPHA has produced overwhelming problems in coding for $MR_1$. At one point in time there were three different divisions of ICDA being used in California. In general it was felt that H-ICDA was better for use in hospitals but not enough to warrant the division caused by CPHA's independent action.

Aside from the professional health data use (planners, epidemiologists, other researchers) there were three types of health professionals that $MR_1$ sought to become involved in their efforts. They were:

- Hospital administrators
- Medical record librarians
- Physicians

It was felt that unless CHDC was seen by these health professionals as an agency operated by and for them, it had little hope of success no matter how sophisticated the information systems might become.

Although $MR_1$ never lacked the philosophical foundation or theoretical justification for its activities, there came the time when it reached the obstacles of operational realities. It went through a serious crisis when the service bureau fell behind schedule in making the $MR_1$ system operational. This experience convinced CHDC that the mode of operation – contracting for programming and data processing – is subject to too many problems to be feasible on a permanent basis. It was viewed that a system like $MR_1$ would require its own staff and its own computer center to do the job adequately. There were several conclusions developed by CHDC that are worth mentioning. They concern localized systems, uniformity of data, universal participation, the role of CPHA, and the role of government agencies.

CHDC feels that medical record information systems should be operated at a local level, if possible. They view HUP as a prime example of involving local health professionals as both beneficiaries and benefactors of a local health data system. CHDC is convinced that this type of involvement is much more relevant to a system's actual impact in hospitals than is the data content of the system or details of the information display.

While taking the stand that health data systems should be localized, CHDC did not attempt to attain uniformity across the nation by using the same case abstracts and computer system. CHDC was of the opinion that the proper approach should arrive at a precise, uniformly accepted definition of essential data items. Although the existing medical record abstract systems show a high level of commonality with respect to data content, there is still the problem area of coding for diagnoses and operations. Besides the complex issues relating to coordination of existing medical records systems, there will remain the ever present problem of hospitals still using manual methods for handling medical records information which consequently is inexcessible to current information systems. CHDC took the stand that all hospitals should have the availability of some form of automation for medical records information.

CPHA is now the only organization with aspirations to operate medical record systems nationally. It is in a unique position to act as the national clearinghouse of data from regional medical record systems such as HUP, QUEST, HSD-W and $MR_1$. If the CPHA were to perform this function two requirements would have to be filled by the regional systems:

- Certain data would need to be established according to uniform definitions (in specific magnetic tape format)
- Money to support the cost of acting as a national data bank.

This would require a significant shift in role for CPHA to becoming primarily a coordinator for the local programs rather than the service organization for individual hospitals on a national basis.

Input would also be needed from government agency representatives regarding what they view as a desirable role of these developments. CHDC has suggested that government agencies provide financial and technical assistance for the implementation of local health information systems with the following three contingencies:

- The local system would need to be operated within an organizational structure broadly representative of the interests in the health field.
- Commitment to participate on the part of local area hospitals and other health facilities as might be included in the information system to be implemented. Commitment to participate would include sharing costs of the operational system.
- The local system would include certain standard data items and there would be agreement to supply these data to authorized state and/or national data banks.

### 7. Connecticut Utilization and Patient Information System (255)

The Connecticut Utilization and Patient Information System (CUPIS) is an interactive, regional health data system whose purpose is to collect, process, analyze, and distribute comprehensive inpatient medical care statistics to hospitals, other health care facilities providing direct health care, and to agencies that are involved in the planning, financing, administration, and research of the current health delivery system (Connecticut Regional Medical Program, Connecticut Hospital Association, Connecticut Hospital Planning Council, Connecticut

Blue Cross, Connecticut Health Department). An integral part of this service will be the continuous consultation provided by the CUPIS staff to medical and hospital administrative staffs and other appropriate personnel of regional clients.

CUPIS is attempting to cover the 35 hospitals in the state of Connecticut and at the moment is operational in approximately seven hospitals. The basic input into the system is:

- A copy of the hospital's own admission form
- A copy of the patient's bill
- A discharge abstract developed specifically to coincide with the order of the hospital's medical record

The CUPIS computer program system is specifically designed for peer review, not only with regard to utilization and cost statistics but with regard to quality evaluation. It is similar to PAS-MAP with the exception that it contains the patient's hospital billing data and demographic data with regard to the particular service population covered by the hospital. Although fiscal controls are part of the package, the ultimate goal is improvement of the quality of medical care through professional education and self-regulations conduct.

CUPIS provides the following types of service:

- *Institutional Services*

  CUPIS provides utilization review exception reports which are based on the Basic Utilization Review Program (BURP). These reports identify cases which may profitably be reviewed by physicians on the appropriate committee of the medical staff. Diagnostic-specific reports, presented in graphic form, are distributed as well as health care indices, reports and analyses. These reports allow the medical staffs and the administration of each facility to be aware of the patterns of care that exist within the facility, and to be able to compare these patterns with other comparable facilities within the state. CUPIS has the capability to allow facilities to have direct access to their own data to review their facility's performance. Special studies will be undertaken to provide facilities with additional types of analyses.

- Regional Services

  Regional clients are provided with information and reports which can serve as the basis for regional planning, program evaluation and special studies. These reports would include patient-centered statistics which reflect the utilization of facilities. It will primarily permit regional clients to accurately plan new programs and evaluate and amend existing programs. In addition, no information concerning individual patients will be distributed to regional clients.

As with HUP, the CUPIS staff works closely with participating facilities to assure the accuracy, correctness, and reliability of the input information, as well as regularly consulting with the medical staff and administration to interpret the meaning of the reports and analyses and to assist them in comparing their performance with other comparable facilities in the state.

CUPIS provides indices and listings that can be used by the medical staff for reference as well as for fulfillment of JCAH requirements. It provides the following types of indices and listings on a semi-annual basis:

- Diagnosis cross-index
- Physician listing
- Operative index
- Surgeon listing
- Newborn listing
- Death listing
- Pathology index
- General patient information

The service report of CUPIS is designed for use both by the medical staff and hospital administration. The first few pages of the report include an age analysis, consultation analysis, multiple diagnoses and surgical analysis for the entire hospital as well as for each service. These service reports are provided on a quarterly basis and the remainder of the report contains for all services and for each service in the hospital an analysis of:

- Admissions – including type of admission

- Discharges – including where a patient was discharged to

- Admission by day of the week – including the type of admission, and the day of surgery (if appropriate)

- Quality of care rates – including consultation rate, infant death rate, maternal death rate, prematurity rate, post-op infection rate, etc.

An integral part of the CUPIS system is a program known as the Basic Utilization Review Program (BURP) which is designed to improve the manner in which patient care evaluation is carried out by the hospital committees. This is accomplished by: (a) selecting cases which have high probability of requiring review, and (b) evaluating these cases to determine the appropriateness of services (quality of care), appropriateness of admission, timeliness of discharge. BURP's approach is to put the patient population into diagnostic categories which account for a significant portion of the hospitalized population. Within each diagnostic category, groups of patients are created according to secondary diagnosis, surgical procedures, age and sex. Each diagnostic category has the unique list of secondary diagnosis, surgical procedures, and age groupings that can affect the treatment or the amount of time required for the treatment. The hypothesis is that patients that have the same characteristics should therefore exhibit the same patterns of care. For a specific diagnosis, patients with the same secondary diagnoses, surgical procedures, age and sex should require the same type and amount of services, and should remain in the hospital approximately the same amount of time. Those patients whose stay and/or amount of services are different from others in the group are considered unusual enough to warrant review of the care received.

The two parameters being used to identify cases which have a high probability of requiring review are: (a) length of stay and (b) the dollar volume of special services per day (a variable for the intensity of the treatment). For each homogeneous group there can be established an acceptable range of stay – a case that remains longer than "X" days or shorter than "Y" days would be identified for review by the medical staff. Limits have also been established for the dollar volume of special services per day. A probability sample can also be taken from within the acceptable range established for each homogenous group. This sample is weighted to permit more cases to be identified from the area close to the limits than from the center of the distribution. When these cases are reviewed it is possible to determine whether the limits are valid and what portion of the cases presumed to be acceptable actually were judged to be inappropriate.

This can be described as Type II error. Once cases have been identified for review, the physicians from the responsible medical staff committee evaluate these cases to determine the appropriateness of services, the appropriateness of the admission, and the timeliness of the discharge. It is imperative that the results of the physician evaluations be regularly sent back to the CUPIS staff. This type of feedback from the physicians allows the CUPIS staff to make any revisions in the groups and/or in the limits in order that cases with a high probability of needing review will continue to be identified by the screening program.

The diagnosis report is dependent upon BURP. For each diagnostic category used in the BURP program and for each homogenous group of patients within the diagnostic category defined by the BURP program, information is generated by comparing the hospital with state figures. These comparisons are made with regard to length of stay and the dollar value of special services per day. The diagnostic categories are comprised of patients with specific discharge diagnoses, secondary diagnoses, surgical procedures, age and sex. Bar graphs are generated to depict the percent of patients with the diagnosis-specific category which had each discharge diagnosis, secondary diagnosis, surgical procedures, age group and sex.

After a homogenous group of patients has been defined, graphs are created to show the length of stay, and the dollar volume of special services per day. These graphs are used as reference in an attempt to understand the pattern of care for a particular homogenous group of discharges from a hospital as well as for similar patients discharged from Connecticut hospitals. Patients whose length of stay or special services per day are on the extreme ends of the distribution will be identified in the exception reports.

The homogenous groups of patients defined by the BURP program and graphically presented in the diagnosis reports are composed of patients who are expected to show similar patterns of care. Any patient whose length of stay or dollar volume of special services per day is different from others in the group, is identified in the exception report. Limits are established which are used to identify patients whose stay or volume of special services per day was greater than "X" or less than "Y". A weighted sample from within the acceptable range established for each homogenous group is also included in the exception report.

Three types of patients identified in the exception reports are:

- Long length of stay or special services per day
- Short length of stay or special services per day
- Normal length of stay or special services per day.

CUPIS is presently funded by the present contract with the Connecticut Regional Medical Program which has been under way since December, 1971. The two previous years of development were also funded by the CRMP.

### 8. Blue Cross Data System (96)

The Massachusetts Blue Cross Data System (BCDS) is now defunct and was superceded by the Massachusetts Hospital Association Utilization Information Service. BCDS was primarily constituted to provide an orderly system for hospitals to analyze utilization of facilities and to compare such utilization with other institutions. Data were provided in simple formats and supported by continued field contact. Before ceasing operation, this regional program covered approximately 35 hospitals in the state of Massachusetts. The basic input document was an abstract of the medical record for each discharged patient. The data base encompassed patient identification and social characteristics, diagnosis and procedure information, and service and planning data. The reports generated included a series of monthly, quarterly, and semi-annual listings, indices, summaries, analyses and comparative reports. The reports generated included:

Monthly Reports

- Diagnosis listing
- Operation listing
- Death listing
- Discharge analysis

Periodic Reports (Quarterly, Semi-Annual)

- Physician index
- Diagnosis index
- Operation index

Semi-Annual Comparative Reports

- Length of stay distribution by days
- Pre-operative stay

- Hospital ranking
- Analysis by day of week of admission

Special Reports and Studies on Request

## 9. Utilization Information Service of the Massachusetts Hospital Association (164)

The MHA Utilization Information Service (UIS) is a computerized, shared medical record abstract system which provides summary information about the individual patients and episodes of illness. This service has aided hospital medical and administrative staffs in fulfilling their obligations to conduct retrospective case reviews. Utilization review information is provided through standard and special reports. Currently the service produces the following standard reports:

Monthly Reports

- Diagnosis listing
- Operation listing
- Death listing
- Discharge analysis
- Diagnosis summary
- Operation summary

Semi-Annual Reports

- Diagnostic cross-index
- Operation cross-index
- Physician and surgeon cross-index
- Discharge analysis
- Operation summary
- Diagnosis summary

In addition to performing its primary function of assisting the hospitals in utilization review, the utilization information service provides other services to improve the operation of the medical record department and assist in controlling costs by eliminating repetitive clerical functions. The service provides, as part of the regular reports, a series of diagnosis and operation indexes and cross-indexes which satisfy the requirements of the Joint Commission on Accredication of Hospitals and, thereby, eliminate the time consuming and frequently inaccurate process of manual creation of these indexes.

UIS also provides the participating hospitals with the information necessary to complete the periodic reports required by various governmental and planning agencies such as the Hill-Burton studies conducted by the Department of Public Health, and studies conducted by various planning agencies.

In the preparation of these reports, large quantities of data have been accumulated. At the present time there are more than 500,000 records in the data bank and approximately 39,000 records currently being added each month. With this data bank UIS is able to perform any specialized utilization-related studies for participating hospitals, individually and collectively. Some of the studies accomplished to date are:

- Readmission rate of patients
- Short-stay cases
- Number of patients and patient days by payment status
- Physician use of facility
- Hospital used by patient, resident, location
- Data for reporting to governmental and accrediting agencies
- Number of emergency admissions
- Number of diagnostic admissions
- Identification of patient
- Use of special care units
- Need for additional or elimination of specialty services

- Comparison with other hospitals by similar type, size, geographic area
- Special medical audit data
- Identification of ten most common diagnoses and operations

UIS has been designed and implemented to insure that the participating hospitals control, understand and utilize this system. The hospitals maintain control through management, medical advisory and medical record administrative committees.

UIS staff are experienced in records analysis, and provide continuous support and consultation to hospital administration, utilization review committees, physicians, and medical records administrators. This staff support assures that participating hospitals fully understand the system's capability, achieve timely submission of complete and accurate data, and make maximum use of the reports furnished. The UIS staff also maintains close liaison with the Department of Public Health and other agencies to assist hospitals in effectively satisfying their legal reporting requirements, to insure that other utilization related surveys/information needs of such agencies are fully coordinated under the UIS activity, and to avoid duplication of effort.

A brief description of each report follows:

- *Diagnosis Listing*

  This document presents, in digested form, the relevant information for each abstract. All cases for the period are listed in order by primary diagnosis. The highlights of the printed format are:

  - Six diagnoses
  - Four operations
  - Four physicians
  - Medical record number
  - Age
  - Sex
  - Origin
  - Admission date
  - Admission status (emergency, elective, urgent)
  - Discharge status indicating alive or dead, coroners' cases, transfer to another institution, autopsy, post-operative death
  - Hospital service
  - Number of consultations

- Length of stay
- Pre-operative stay
- Special Studies

- *Operation Listing*

  All case abstracts for the period containing operative procedures are listed in this report, in primary operation code order. Each group of related operations are distinguished by a descriptive title and a total denoted by an asterisk for each primary operation code is provided.

- *Listing of Deaths*

  Each abstract relating to patients who died during the period are presented here, and are grouped into four categories. The categories are: deaths not autopsied, deaths autopsied, coroners' cases not autopsied, coroners' cases autopsied. Total of cases in each category is displayed.

- *Diagnosis Summary*

  This report summarizes the data presented in the diagnosis listing. A feature of the report is the selection of two study groups. The first study group excludes cases resulting in death or discharge against medical advice, and cases whose length of stay exceeds 99 days. The second group comprises a selection of patients who experienced operative procedures. Excluded from this group, in addition to the previously cited exclusions, are diagnostic procedures, radiotherapy and other selected operations.

- *Operation Summary*

  This report summarizes the data presented in the operation listing. One study group is presented and excludes cases whose primary operation code represents a diagnostic procedure, radio-therapy, or selected operations. Also excluded are cases resulting in death or discharge against medical advice, and cases whose length of stay exceeded 99 days.

- *Discharge Analysis*

  This report presents discharge by service, discharge days and average stay with breakdowns by age groupings, admission and discharge status. Also provided are totals for adult, pediatric and newborn patients. Additional data is displayed on transfers, unusual deaths, rates on deaths, autopsies and consultations, percentage of admissions and discharges by day of week, patient origin, and use of special care units.

- *Diagnosis Index*

  This index in a cumulative report of all cases for a six month period. Diagnoses are listed in primary order and are immediately followed by those cases for which the same diagnosis is reported as an associated or secondary condition.

- *Operation Index*

  This six month cumulative report lists all cases on which surgical procedures were reported. Primary operations are listed by category, and are followed by those cases having the same operation recorded as secondary procedures.

- *Physician Cross-Index*

  All cases for the period are listed in physician/surgeon code number order. The cases are further grouped into four categories:

  –Cases in which the doctor was attending physician
  –Cases in which he was associated as other physician
  –Cases in which he was principal surgeon
  –Cases in which he was associated as other surgeon

  The total number of patients, patient days, average stay per patient, number of expired patients, consultations and consultation rate, are provided for each category additionally. The average pre-operative stay is provided for each of the groupings by surgeon.

- *Semi-Annual Comparative Report*

  This report provides a ranking with other hospitals by length of stay. Rankings are done by the following categories:

- Diagnosis
- Operation
- Comparison with previous six-month experience

The report also provides ranking with other hospitals by length of stay within the day of week the patient was admitted. Rankings are categorized by:

- Pre-op stay within
- Day of week admitted

- *Length of Stay Criteria*

Under the UIS system each hospital may set its own parameter for:

- Short stay patients
- Long stay patients

The criteria is based on diagnoses and may be useful for selecting cases for the utilization review committee. The length of stay report displays the total number of patients with certain diagnoses for the period. It highlights the number of patients who fall below the hospital's previously selected criteria for short-stay patients as well as the number of patients who have lengths of stay longer than the hospital's long-stay criteria. The diagnoses to be studied are determined by the hospital staff. The UIS program management consists of the following committees:

- Management Committee composed of participating hospitals

- Medical Advisory Committee composed of utilization review physicians of participating hospitals.

- Participating Advisory Committees

A technical advisory committee was created by the Management Committee and consists of medical record librarians of participating hospitals, and chairman of the UR committee in participating hospitals. These committees may:

- Approve design of future reports

- Devise existing reports

- Suggest length of stay criteria

## 10. Relative Stay Index (RSI) of the Ontario Hospital Services Commission (201)

The Relative Stay Index (RSI) is a number which states the percentage by which a group of hospital patients stay a longer or shorter time in a hospital than would be expected. It may be referred to as an "index number," and its construction is similar to the cost of living index. RSI can be computed for any group of hospital patients who are associated with one another in some way; for example, there could be patients who use the same hospital or have the same doctor, or live in the same community.

The estimate of how long patients are expected to stay in hospitals is made by comparing the experience of a group of patients under consideration with the experiences of a much larger, but similar, group of patients. The experience of this larger group of patients provides norms, or standards, against which a target group of patients is compared. Therefore, the norms depend on the group of patients which are selected to serve as the reference group. The Ontario Hospital Services Commission has developed an RSI for each hospital in a group of public general hospitals, using the experience of the patients who were discharged during a particular year. The grouping of hospitals is on the basis of bed size and teaching affiliations. The norms, which the patients in a given hospital are compared against, are provided by the experience of all similar patients discharged from all hospitals in the group.

The important feature of the RSI is that patients are classified as being different types, so that only patients of the same type are compared with each other. If the patients were not categorized in any way at all, then one's patient experience would be compared with the experience of all patients; this results in comparing the "raw" length of stay of various hospitals with each other. It is extremely unlikely that comparisons of average length of stay, which do not take into account patient mix, have any meaning. In putting forward the RSI, the fundamental position of the Ontario Hospital Service Commission is that useful comparisons cannot be made until account is taken of, at least, age, sex, and diagnosis mix of hospital patients.

The RSI takes into account differences among patients by classifying them by different types. The classification scheme which is used cannot be regarded as ideal; since it suffers from limitations which arise for the following reasons:

- Limitations imposed by the data based on the way in which patients can be classified.
- Technical limitations imposed by computer resources which are available to the project.

- Kinds of arbitrary choices about classification which are required to get a project of this type under way.

For each hospital, a separate RSI is constructed for each broad classification of disease which are combined to form an overall RSI hospital. Any RSI can be judged as falling into one of the following three categories:

- The RSI is low; i.e., on the average, most of the patients remain a significantly shorter period of time in the hospital than would be expected; or,

- The RSI is high, i.e., on the average, patients remain a significantly longer period of time in the hospital than would be expected; or,

- That the hospital's patients do not differ significantly from the expected length of time, i.e., any differences which can be observed can be regarded as a chance variation.

An important issue here is how the RSI may be interpreted. Are low RSI's desirable? Are high RSI's undesirable? Hospitals in Canada find themselves in differing circumstances but, other things being equal, prefer shorter lengths of stay to longer lengths of stay. However, there may be shortages of extended care facilities in some areas, making it difficult to discharge certain types of patients. Home care programs may not exist in some communities. Patients may come from remote or medically isolated areas, which result in doctors being reluctant to discharge such patients as early as they otherwise might. Extenuating circumstances can exist, and before labels of "good or bad" can be attached to RSI's, these types of circumstances are evaluated.

Conversely, the Ontario Hospital Services Commission recognizes that high RSI's can be observed without extenuating circumstances. In these cases, a high RSI indicates situations in which admission and discharge committees are not working effectively or it may identify situations in which the scheduling of patients is poor, or it may be symptomatic of situations in which a hospital is not using its resources effectively.

A hospital's RSI for a particular diagnosis category, or for the hospital as a whole, may provide evidence that the hospital's performance is significantly poorer than the performance of other comparable hospitals. Such a finding, should lead the hospital to inquire whether its length of stay performance can be improved. The usefulness of the RSI is that it provides gross information which indicates to a hospital any unusual features in length of stay which might be regarded as "symptomatic."

Once a problem is identified, however, the RSI offers little diagnostic guidance. To fill this diagnostic gap, the Commission has recently published Ontario Length of Stay Tables: 1969-71. The purpose of this new companion publication to the RSI report is to provide detailed information which will be useful to the hospital for:

- Detailed retrospective examination of the hospital's length of stay experience.
- Ongoing evaluation of the experience of patients of individual physicians or groups of physicians.
- Admission and discharge scheduling of patients.

It is the information and methods contained in the length of stay tables which are used to diagnose one of the specific problem areas. The RSI report is presented in order that hospitals can identify general problem areas by the comparison of their performance with that of other similar hospitals.

The latest addition of the RSI (done in 1971) presents a series of tables preceded by an introductory section which explains the derivation and interpretation of the tables. There are six different versions of the RSI report, each relating to a different group of public general hospitals in Ontario. In each version, the tables relate to the experience of the hospitals in the group, but the introductory material is common to all versions.

The introductory section of the RSI is concluded by four summary tables which present the experience concerning some aspect of the average length of stay of RSI of all hospitals in the group, and then show the experience of all hospitals in the six groups for the same aspect.

In the next section of the book there are detailed tables listed for each hospital in the group. For each hospital, there are three different RSI tables and a five-year summary table.

- The 1971 RSI table shows the most recent experience of the hospital.
- The 1970 RSI table is included so the hospital can compare its most recent experience with the experience of the previous year.

- The 1969-71 RSI table combines the experience of the three most recent years so that the hospital can obtain a longer-term perspective of its experience

- The five-year summary table presents summary statistics since 1967.

The last section of the RSI report contains 42 diagnosis tables. The first of these tables combines a hospital's experience with all diagnosis categories, and shows the overall or total experience of each hospital in the group. This is followed by similar tables for each of the 41 diagnostic groupings used in developing the overall RSI.

These tables are included so that a hospital can readily see its experience in a particular diagnostic area, in comparison with experience of other hospitals in the group. For hospitals with 100 or more beds, the diagnosis tables present 1971 experience. For hospitals with fewer than 100 beds, the diagnosis tables present the combined experience of 1969-1971. In similar hospitals there are a number of diagnosis categories with very few cases in one year, and the use of the three year experience provides a better perspective.

The Ontario Hospital Services Commission had four different motivations in developing the RSI report. They were:

- The Commission believed that it could assist hospitals by providing timely, comparative information about performance and a variety of dimensions of hospital effectiveness and efficiency. The RSI program was viewed as an application of this principle. The emphasis on providing timely information was expanded in 1971 with the production of interim RSI statistics on a four-monthly basis.

- A second objective was to upgrade the level of discourse about the average length of stay, as an indicator of hospital performance. The average length of stay has long been used in forming opinions about the efficiency of and the resources needed by a hospital. The Commission recognized that the average length of stay is only one of the dimensions of hospital performance. Although the average length of stay indicator may be of little or no significance in the future, the Commission regards average lengths of stay comparisons as a significant indicator at present.

- The third motivation for the production of RSI arose because, within the public sector, there was a search for indicators which would be useful in assessing the performance of individual institutions, or government programs, be they hospitals, schools, etc. The RSI can be viewed as an attempt to develop one such performance indicator for hospitals. The Commission has concentrated on its development as a measure of hospital performance because much of the necessary data was readily available and because the average length of stay indicator was already in common use. The Commission emphasized that the RSI is not the only important dimension of hospital performance.

- The final motivation for the development of the RSI arose from the financial incentive plan that was introduced in March 1970 for hospitals in Ontario. The general philosophy of the incentive plan was that a hospital which under-expends its approved financial allotment, while substantially maintaining its treatment and rehabilitation programs, is entitled to keep some part of that saving. The Commission recognized, however, that before the real amount of saving could be known, changes in the volume of patient care would have to be identified and adjusted.

At the time of the introduction of the incentive program, measures of the change in volume of patients still had to be developed so that initially approved budgets could be adjusted, and savings under the incentive plan could be determined. An additional problem was how to evaluate the desirability of changes in volume. The introductory statement of the incentive plan outlined the Commission policies which would prevail in the presence of different types of behavior of patient days, number of patients, and length of stay. At the time of introduction, the statement was necessarily vague, since the mechanism to be more explicit was lacking. Consequently, the final motivation to develop the RSI was to give numerical substance to the general statement of policy about volume under the financial incentive program.

### 11. Medicare Analysis of Days of Care (MADOC) of the Social Security Administration (173, 217)

In order to assist hospitals and intermediaries in assessing utilization patterns, the Social Security Administration has developed statistics on how long Medicare patients remain in short-stay institutions. Medicare Analysis of Days of Care (MADOC) began in the fall of 1970 with the purpose of collecting data on Medicare beneficiaries. The first report (MADOC-2) covered hospital discharges in the second half of 1969.

MADOC data identifies hospitals for which the average length of stay, determined for a sample of Medicare patients, differs from an average estimated length of stay, taking into account the hospital's location, patient mix, and other characteristics. Through the use of a multiple regression technique, an equation is established for each geographic area relating length of stay to characteristics of the area's patients and hospitals. The equation is based on 12 months experience for the particular geographic area. For each hospital, an average estimated length of stay is derived for discharges during the most recent six month period available, based on the area equation previously established. Each hospital's current experiences are compared with that of all hospitals in its area for the preceding year.

The tables in the MADOC report are based on data from bills for discharges from short-stay hospitals occurring in 20 percent of the population 65 years of age or older insured under the hospital insurance portion of Medicare (Part A). The sample is identified by the individual's health insurance claim number which is entered on the hospital bill. Only those bills received and processed by SSA before the cutoff date for preparing the report (approximately six months following the reporting period) can be included. To the extent that late bills reflect exceptional circumstances, the data will be affected by a reporting bias.

For purposes of the MADOC analysis, hospitals throughout the country have been grouped into 275 geographic areas. These areas are made up of counties or parts of counties within each state defined as the hospital service area for the Hill-Burton program, but modified for the present application wherever possible. They also conform to the area serviced by an intermediary, contain a minimum of five hospitals, and 1000 beds, and a maximum of 50 hospitals. The areas were defined to reflect, among other considerations, patient origin, availability of medical and paramedical manpower, and common patterns of medical care.

The variables that can be entered into the regression equation are limited to those on the hospital bill, the patient characteristics available to SSA through application for a claim number, and the hospital characteristics contained on the SSA certification form. A number of variables known or thought to contribute to explanation of variation in hospital stays are not in the array of information at hand for study and cannot be entered into the regression equation.

Length of stay is used as the dependent variable in the regression equation. The independent variables are:

- *Primary Discharge Diagnosis*

  The diagnostic variables that are entered into the equation as absent or present include 29 individual primary discharge diagnoses and 19 clusters of diagnoses. The 29 diagnoses are those that occurred most frequently in the sample of Medicare short-stay hospital discharges in 1966. The clusters of diagnoses were characterized in the same sample of data by a similar length of stay. As a result of the preliminary work, using joint variables, composite variables were formed to reflect special effects that were produced on length of stay by the joint occurrence of two variables. Consequently, for eight of the 29 diagnoses, discharges with surgery are treated separately. Another diagnostic variable is split up into discharges reporting this diagnosis only, and discharges reported with additional diagnoses; and finally, the presence of both additional diagnoses and surgery is considered as another variable.

- *Hospital Variables*

  Twelve hospital variables are used, including hospital size, measured by the number of adult beds, and the number of services provided by the hospital. Type of hospital control and service characteristics are included as either absent or present. The information about each hospital is obtained from forms completed by the hospital in its request for participation in the Medicare program.

- *Patient Variable*

  Patient variables in the equation are limited to age, sex, and race.

- *Treatment Variables*

  This class of variables are intended to reflect the extent of treatment and includes charges for the selected ancillary services. These charges are also used as an indirect measure of the intensity of care and the severity of the patient's condition. Whether or not there was a surgical procedure, there is an additional variable.

The semi-annual report package consists of three basic tables:

- *Table I*

  This table shows the average length of stay of the sample for all patients discharged from each hospital along with the average length of stay of Medicare patients discharged from other hospitals in the same geographic area. For each hospital, the average actual length of stay is compared with the average estimated length of stay. The estimated figure is based on the area of experience, which takes into consideration the characteristics of the hospital, its patients, their illnesses, and the kinds of treatment received.

- *Table II*

  This table distributes the same discharges whose average was shown in Table I by length of stay in order to provide a quick comparison of the actual experience in each hospital with that of the other hospitals in the area as a whole.

- *Table III*

  This table shows the actual average length of stay for each hospital with an adjustment period. Data by discharge diagnoses are limited to the ten diagnostic conditions (or groups of conditions) reported most frequently as requiring hospitalization in the United States among Medicare patients.

In examining the average estimated and actual lengths of stay in Table I, emphasis in making comparisons is directed solely to the differences between the actual and estimate for each hospital rather than direct comparison of actual to actual or estimate to estimate for different hospitals. The mix of cases varies from hospital to hospital in many ways. For example, a hospital with actual length of stay of 12 days and an estimated length of stay of 11 days, may possibly turn out to be making less appropriate use of hospital beds than a hospital with actual stay of 16 days but with an estimated stay of 14 days, if the former figure is marked by an asterisk and the latter figure is not marked. Sampling fluctuations are also taken into account in the flagging of averages in order that those so marked can be safely regarded as exhibiting significant deviations. The presence of an asterisk warrants hospital staff investigation to determine the causes of deviation. Any institutions could utilize other sources of information to compliment the MADOC data in their analysis of operations to determine how effectively their resources are used.

In addition to the comparison between average actual and estimated length of stays for a six-month period in Table I, the monthly results for each hospital are shown in terms of the deviation of the actual from the estimated length of stay. The direction of the deviation is shown, that is, a plus sign if the actual is greater and a minus sign if it is less than the estimate. Actual differences are not entered on a monthly basis since sampling variability is much greater than for the six-month period. If all signs are alike, consideration should be given to the possibility that a pattern of consistent deviation exists which also warrants hospital staff investigation.

The number of variables known are thought to contribute to an explanation of the variation hospital days, and could not be included in the regression equation since they simply are not available on any records required in the administration of the Medicare program. However, a few variables that have been demonstrated to be related to length of stay for which data can be obtained, have been deliberately omitted from the regression equation. For example, length of pre-operative stay, and day of week of admission or discharge, are excluded. If these had been included, the estimated length of stay would allow for variables that are within the administrative control of the hospital, diminishing the value of the estimated average in assessing performance. The only variables allowed in the estimated equation are those presumed to be outside the control of the hospital. Therefore, the estimated value includes the variable reflecting medical school affiliation, which constitutes a sixth factor in determining length of stay.

The Social Security Administration has experienced some data collection problems in using the hospital billing form SSA-1453. One such problem is the recording of the discharge diagnosis on the form. Although there is reason to believe that the length of stay and information on the patient's status is shown with a high degree of accuracy, the business office does not immediately have the final discharge diagnosis contained in the patient's medical record. In an effort to complete the bill quickly, the admitting diagnosis may be recorded instead of the discharge diagnosis.

The personnel and business office may also not have any great skill for medical terminology or good judgment concerning the relationships between diagnosis and surgical procedures. The Social Security Administration is unaware of the number of hospitals that are not using discharge information to complete form SSA-1453.

Even when the diagnostic data on the billing form have come from the medical record, there is still a serious problem of interpretation. The instruction manual accompanying the forms emphasizes that the discharge diagnosis should reflect information of the patient's medical record relating to all conditions causing the current hospitalization, but when the form alone is in view, it is possible to place other interpretations on the form's request for primary discharge or current diagnosis. The problem can be corrected, in part, by a more clearly stated form. If the same clarity existed in the face sheet itself from which the diagnostic data is copied, and, in addition, if there was a uniform face sheet in all hospitals, a second step would have been taken to improve the reporting of discharge diagnosis and procedures. Agreement with the medical profession on definitions of face sheet items and precise terminology could greatly increase the usefulness of consistent forms.

The primary purpose of the form SSA-1453 arose out of Social Security's legal obligation to pay for covered services provided to Medicare beneficiaries. The form's first use is to determine "coverage" and the amounts to be reimbursed to the hospital. As an important byproduct, the information tabulated from these forms is also used in implementing the system of review of hospital services for medical necessity.

### 12. The Hospital Medical Records Institute (HMRI) of Ontario, Canada (214)

Medical care in Canada is strongly influenced by the legislation governing health services which provides for substantial control of hospitals by the provincial governments. There were factors which were considered sufficient to warrant the development of a Canadian system for hospital utilization studies and the evaluation of medical care that led to the planning of the Hospital Medical Records Institute in the Province of Ontario. HMRI services approximately 77 short-term general hospitals in five provinces of Canada with a total of approximately 600,000 annual discharges.

HMRI was organized in 1963 through the efforts of the Ontario Medical Association, the Ontario Hospital Association, and the Ontario Association of Medical Librarians. The Ontario Hospital Association funded $150,000 for starting capital. HMRI was organized under a memorandum of agreement providing an independent board of directors comprised of five appointees from the OMA and OHA who are aided by two advisors from the OAMRL. The memorandum of agreement also provides that the director of the HMRI be a licensed Doctor of Medicine.

The HMRI is primarily concerned with the promotion of a medical audit system. HMRI considers utilization studies as only a part of a good medical audit model. The philosophy of HMRI is that data collected and displayed are not in themselves sufficient for assessment of medical practice. It believes that data must be interpreted by those familiar with the complexities of medical practice and the local conditions prevailing on the community level. Consequently, only doctors on the staff of the local hospital are considered competent to evaluate the quality of medical care within their institution and it is the purpose of HMRI to assist them. Enrollment in HMRI is contingent on the request by the medical staff and approval by the governing body of the hospital.

HMRI does not exist for accounting purposes and has not entered into this field since hospitals are efficiently surveyed and audited by professional hospital service commissions, such as the Ontario Hospital Service Commission, which allows each hospital a certain per diem rate of its operating budget. Also, with the existence of a universal provincial insurance plan, it is unnecessary to classify a patient by payment categories.

HMRI provides three major types of services to assist physicians in developing and operating a program of study and control of the quality of medical care in their hospitals. These services consist of:

- A variety of medical data which is abstracted from patients' records is turned over to physicians in various organized reports. Their purpose is to allow the assessment of patients care on their own merit, in relation to each other, or to the overall aspects of hospital process. HMRI does not feel justified in exchanging data among its member hospitals. If comparative statistics are needed, they can be obtained from the Hospital Commission or by a direct exchange of information between interested hospitals.

- Indices extensively cross-referenced by disease and procedure are provided on a monthly and annual basis. There are other reports which include listings by physician, by medical record member, by resident service, and by physician; death listings by diagnosis; service analyses and hospital summaries. These reports facilitate quick review and appropriate selection of interesting and significant cases or events. The indices also assist the medical record librarian on the retrieval and assembling of data for use by physicians.

- Analyses of each hospital service or department and a summary of selected hospital patient activities is provided on a monthly and annual basis for individual study and for collective study by those with administrative responsibilities, e.g., medical committees, heads of service, chiefs of staff, administrators, and medical records librarians.

HMRI also provides facilities for special studies either with the standard case abstract or by design of special abstracts with relevant construction. The institute provides consultation to doctors in developing these kinds of studies. The case abstract is designed in such a way that data may be introduced relating to any branch of a hospital staff should that branch become interested in developing a study. Although HMRI recommends that the coding of diseases and operations follow the ICDA, it permits the use of other coding systems that are recognized and approved by the physicians involved. These include the Systematized Nomenclature of Pathology (SNOP) and the American College of Radiology Index of Radiological Diagnoses. Even though standardization of indexing of records is desirable, it is encouraged. There are some hospitals in which specialized code systems have been developed to meet special needs. Therefore, the services of a data processing programmer are not denied the physicians in the hospital.

The following is a summary of HMRI policies:

- Since hospitals differ in the needs for data both in respect to type and extent, HMRI does not compel hospitals to abstract in one or the same way. The HMRI case abstract is open-ended as many feel it possible that multiple abstracts may be submitted if required to report a case completely.

- Hospitals make the best use of data that are indexed in accordance with their needs. Whenever possible, though, data are incorporated into an index already available in order to simplify the work of HMRI and reduce the cost to the consumer.

- All data for each case appear in every report to which they are pertinent, regardless of the number of lines of print required. There are no partial printouts in the report.

- Reports depict the involvement of each service when a patient is hospitalized in more than one. Coding of service transfers are performed where the hospital wishes to have pertinent data for each service in order to present the true picture of its work load.

- Hospitals are encouraged to be selective about detailed data on investigation and management of patient care, although any information will be coded if desired.

- HMRI does not believe that the comparative experience of other communities is necessarily germane to the assessment of clinical judgment. They believe that the hospital comparisons are only useful when all factors affecting and influencing the practice of medicine in communities are understood. Comparative studies are viewed as being potentially misleading.

### 13. Hospital Inpatient Enquiry (278)

The statistical record of the hospital service in England and Wales began in 1949 as HIPE. Its purpose was to be a guide to morbidity occurrence in the community, and for use for central and local planning purposes in terms of the characteristics of patients and their diseases.

HIPE has been through three stages:

- Volunteer hospitals supplied summaries on 100 percent of all patients discharged (1949 and 1951).
- Attempts were made to collect summaries from every 10th patient discharged from all national health service hospitals excluding mental health hospitals, full fee paid paying patients, and some staff patients (1952-64).
- An increasing number of hospital regions (fifteen statutory bodies responsible for running the hospitals) are collecting summaries of all patients discharged and supplying the HIPE quota from their own file (1965-present).

Although the collection or processing of records is on a continual system, the results emerge as yearly batches. The time lag between the end of the year of discharge and the first firm tabulation is less than twelve months, while the time until publication is extended to as much as two and one-half years. The system is limited by the slowest hospital in the country, which is the weakest link in the series of sequential events. Regions which process their own data and assist in the Hospital Activities and Analysis (HAA) do produce quicker returns.

The records received by HIPE contain either the name or the address of the patient but they do not contain the name of the physician in charge. In the early stage of HIPE, an attempt was made to link the records of the same patients by means of name, or initials, which was done at the regional level and also experimentally at HIPE. In general, the numbers provided by HIPE are periods of hospitalization (not numbers of patients) and are inflated by one patient entering the hospital more than once or being counted more than once by transferring hospitals. HIPE currently publishes about 20 standard tables annually showing cross-tabulations by age, records, patient days, diagnosis, deaths, accidents, hospitalization patterns and children, and other parameters. In addition, several reference tables are produced. One of the most useful of these has proved to be the analysis of each four-digit ICD category into 13 age groups for each sex. Some inquiries need special computer runs, others need ad hoc programs.

A simple method of retrieving information about the small groups is a line-by-line printout of the coded record. This enables the original source document to be identified and reviewed either for checking or for further information. It has proved particularly useful in revealing drugs and poisons.

The use of a 10 percent sample facilitated initiation of HIPE by reducing the work load in a local hospital and in reducing the running time needed to process punch cards with mechanical equipment. The processing of summaries locally by regions is considered to be beneficial because of closer control of the quality of the entry data. Greater administrative control at the local level will work towards rapidity in processing the statistics. Processing at the hospital level is confined mainly to the larger hospitals and to the teaching hospitals and enables catering to the personal desires of the hospital staff.

Since the records are anonymous, it is not possible to identify repeated admissions of the same patients; i.e., count is of hospitalizations, not patients treated. Also, the records cannot be checked against deaths or other sources of information.

HIPE is at a disadvantage because of the provision of free hospital treatment in Britain, which removes one important incentive to processing patients' data rapidly before discharge from the hospital. Most hospitals find that a substantial portion of records are not returned to the medical records department until six weeks after discharge. The absence of this financial incentive also removes a simple method of measuring efficiency in hospital administration by the "throughput of patients." The best financial policy for hospitals may not be the best policy for the patient, nor may it be the best policy for a service which is responsible for the patient after discharge from the hospital.

Some investigators are inclined to accept HIPE data as accounting for all hospital services in the country, although more than 10 percent of the patients are in private units outside of the national health service. Fragmentary and indirect information about the 10 percent can be obtained but more information possibly through other channels is needed.

The development of HIPE entailed the formulation of special classification of service needs. For example, an operation code was developed in 1951 and a first version was published in 1956. Based on experience, a revision was concluded in 1969. A code for geographical administrative areas was also needed to classify the place of residence of patients since the existing codes took no account of hospital regions. The diagnostic code (ICD) was found to be inadequate to code the detail required in some parts, and special subdivisions were subsequently introduced.

Inclusion of more clinical, laboratory, therapeutic data and summaries will require the production of classifications to more adequately cover symptoms, including complaints and physical signs, results of clinical and laboratory tests, and details of incentive and other care.

The comparison of length of stay has been considered important but no solution has been found. Three major suggestions have been:

- Arithmetic mean
- Median
- Geometrical mean

In terms of the use of HIPE data, the interest of hospital administrators has focused on the following topics:

- Duration of stay to investigate the causes of regional or other differences or to plan for extensions or changes.
- Differences in admission rates per head of population.
- Catchment areas of hospitals and hospital groups to determine where deficiencies of service might lie.
- Department differences to aid in the planning of buildings and staff training.
- Frequency of readmission or the occurrence of death after discharge.
- The influence of personal and environmental factors, not only age and sex, but marital status, occupation and social class, housing conditions, and household circumstances.
- The reasons for changes in the admission rates, whether due to real changes in disease incidence, changes in medical views and practice, or changes in social structure.
- The presence of environmental hazards, especially poisoning by drugs and external pollutants.

### 14. Scottish Hospital Inpatient Statistics (112)

In Scotland, the collection of statistical data on patients discharged from national health service hospitals was started in 1961 when a statistical abstract was completed for every inpatient with the exception of those discharged from obstetric wards and mental hospitals. These statistical abstracts were anonymous at that time except that it enabled the individual patient to be identified at the hospital by means of a case reference number. This form was amended in 1967 and consideration is being given to further amendment. In 1963, the service was extended by including data on patients in mental hospitals, and in 1969, obstetrical hospitals were also included. Although the basic material on the forms is identical, no attempt has been made at producing a single set of statistics.

The initial purpose of these statistics was to provide central and regional administrators with facts concerning the use made of the most costly part (hospitalization) of the national health service. With data available on the basis of summaries of individual patient records, a large amount of flexibility of analysis was available which could not be obtained from tabular statistical summaries of activities of hospitals. These data enable observation to be maintained on the trends of disease among hospital patients and on the social and demographic characteristics of these patients. These data are also of assistance in planning and administration of services. Since it has been a general policy to provide feedback to individual hospitals, sampling has never been considered in collection and initial processing.

The second purpose of these statistics was to provide epidemiologic data, using the term in its broadest sense, since hospital data, even considering their drawbacks, remain the most important source of data on morbidity in the community. The difficulties of interpreting are tremendous since current statistics relate to episodes of inpatient treatment, rather than to patient's discharge, and because of the high degree of selection operating on the admission of patients to the hospital.

During the period of data collection, their potential value to physicians has been greatly realized and it is felt that the most important reason for their collection is to provide physicians with statistical data on the management of their patients and to form a starting point for clinical, epidemiologic and medical care studies. Since they are related to all patients and not just a sample and because identifying data can be provided, a listing of all inpatients discharged from a hospital is routinely made available for use at the hospital and, subject to restrictions on confidentiality, a similar listing held centrally can be used to provide research workers with what is in effect a national diagnostic or disease index.

The abstract form for the general hospital inpatients allows identification of the individual patient by means of surname, initials, data of birth, marital status, and case reference number, and the individual consultant or general practitioner in charge of the case in the hospital is also identified by means of code or number. The form was designed to serve a dual purpose as both a statistical abstract and clinical summary. It is a two-part form with the top copy being sent to the Scottish Home and Health Department and the bottom one being retained in the patient's clinical notes with a clinical summary attached.

The forms themselves are usually completed by a medical records clerk, although the responsibility for the accuracy of the abstraction of medical information rests on the consultant in charge of the case and it is known that this is not always strictly observed. Until recently, there has been little local use made of the data and the completion of the form is delegated to a junior clerk, often with little insight into, or knowledge of, the medical problems involved. This results in the abstraction of the wrong term or abstraction of an incorrect order. Coding, with the exception of occupation, is done at the hospital. The completed forms, which amount to approximately five hundred thousand per year, are submitted to the Scottish Home and Health Department usually within one month of the discharge of the patient. Forms are also completed when a patient is transferred to the care of another physician.

There are basically three types of routine tabulations that are produced annually and two types that retain listings. In addition, ad hoc tabulations and listings can be produced at the request of hospitals or bona fide researchers. The reports are described below.

Routine Tabulations

- *Published Tables*

  These are prepared annually. Also, the tables have diagnosis as one of the principal factors and these data are shown variously by duration of stay, waiting time, etc. Time trends, regional and urban/rural variations, and specialty of treatment are among the subjects analyzed. The tables, in essence, provide a statistical description of inpatients in Scotland.

- *Regional Hospital Tables*

  Tabulations which are not published are sent to every hospital in Scotland giving details of the inpatient work of that hospital according to the many factors in the published tables, but putting particular emphasis on the diagnostic and specialty aspects. A table is also provided showing the service area for each hospital as a whole and for each department. Regional hospital boards also receive copies of these tables, together with regional summaries. The tables provide a basis for comparing the detailed work of an individual hospital with a national or regional norm.

- *Scottish Consultant Activity Review Statistics (SCARS)*

  Starting with 1967 data, tables were sent directly to each physician responsible in the inpatient care of patients describing his case load in the area of review. These tables are described below.

Routine Listings

- *Diagnostic or Disease and Operations Index*

  An index is sent to each hospital or board of management listing the patient treated in the hospital in the order of diagnosis of the ICD, and an operation index is provided in the order of the General Register Office Code of Surgical Operations. Space is provided in the summary form for the recording of up to three diagnoses and two operations per admission and the case will appear in the index under each diagnosis or operation recorded. These indexes are usually held in the medical records department of each hospital.

The hospital diagnostic index serves two purposes. The first is to enable easy identification of cases and to facilitate access to appropriate clinical notes which might be needed for research purposes or perhaps for examination as part of patient care evaluation procedures. The second is for the index to form the basis of simple tabulations required for either clinical or administrative use.

The second form of the diagnostic index is the national one which is held in the research and intelligence unit of the Scottish Home and Health Department. Apart from the ease with which many of the simpler statistical questions can be answered from each listing, this provides research workers with access to either a national sample or a complete list of cases treated in the hospital with a certain condition. Patient names are not disclosed to research workers. The Scottish Hospital Inpatient Statistics do not differ basically from any other health data systems in the field. However, there are two aspects in which developments in progress may be rather unusual. The data that has been sent to hospitals are relatively bulky and require considerable effort on behalf of those interested to make the desired extractions on any particular topic. Although they may be of considerable value to medical administrators, it is unlikely that anyone but physicians with marked epidemiologic interests would have any particular use for them, and then only rarely. It was felt that the data in this form, which is similar to those issued by CPHA and others, lose much of their impact because of this.

Consequently, there has been an attempt to produce summary data so that each physician is presented with one, or at the most two, sheets of paper in which some detail of his own work is shown. Starting with the data for 1967, tables have been sent directly from the department to those physicians responsible for the care of inpatients, describing his case load for the year under review. Together with these tables, comparative regional and national tables for the same specialty and an accompanying letter, and note of explanation are also sent.

The material sent to each physician relates only to his own work and to regional and national averages. It is hoped that physicians finding information of sufficient interest will compare their experiences with that of their colleagues. Similarities and differences revealed might then result in the initiation of further investigation to provide a basis on which patient care evaluation techniques could be developed.

The statistical data abstract at the present is extremely limited and experiments sponsored by the Scottish Home and Health Department are aimed at the possiblity of extensions through a particular specialty. Another possible extension, presently under investigation, is the ability to provide a set of spare boxes on the abstract form which physicians will be encouraged to use as they wish with the department undertaking simple analyses on requests. Inpatient data only cover a part, although an important part, of hospital work. With the increasing tendency towards outpatient care and domicillary treatment, there is a need for statistics on outpatient care. The problem here is one of greatly increased numbers that have to be handled. The national collection of outpatient statistics probably will wait until the necessary statistics can be captured as a by-product of routine procedures. However, a small part of the study has recently been done using an amended version of the abstract form. In addition, a special abstract form is used for patients in mental hospitals and for patients discharged from psychiatric wards in general hospitals. Because of the long duration of stay of many patients in these institutions., it has been thought necessary to have statistics available upon admission, discharges, and residence. In addition, statistics are also being collected for obstetrical patients.

## 15. The Hospital Discharge Abstract System in British Columbia (256)

On January 1, 1969, the British Columbia Hospital Insurance Service began its 21st year of operation. The province's program has four main objectives:

- To protect residents from the problems of the financial burdens associated with hospitalization.
- To provide the hospitals of the province with a regular source of income.
- To assist hospitals in developing and maintaining high standards of patient care.
- To assist communities in providing adequate hospital facilities.

During recent years, the service has developed from a bill-paying organization to the agency responsible for providing hospital care and has given more emphasis to the latter two objectives. It is towards this end that the province has developed its system of data collection. Because of its usefulness in hospital planning, in addition to collecting hospital data, the British Columbia Hospital Insurance Service is also the largest user.

The basic form used by the British Columbia Hospital Insurance Service for data abstraction is called the admission/separation record. This form, supplied to all hospitals, is completed for each patient admitted to the hospital. It is a multi-purpose form used by a number of divisions within the service, and consists of one page. There are, however, conflicts over space. Space allocations are guarded when requests for additional information are made and this is the limiting factor in the abstraction of discharge data.

Most of the information on the admission/separation record is entered at the hospital; however, medical and residence coding is done by the hospital insurance service. As is the case in most provinces in Canada, diagnostic information is coded according to the International Classification of Diseases, adapted. The information is abstracted from the hospital's medical records provided by the hospital, and coded by the medical coders from the Hospital Insurance Service. This creates an environment for uniformity in coding. Provision is made for coding a primary and secondary diagnosis and a primary and secondary operation as well as external causes of injury for accident cases. There is presently in Canada some conflict of opinion as to what should constitute a primary and secondary diagnosis. A number of provinces have adopted the utilization view, such that the primary diagnosis is the diagnosis that is most important in terms of utilization of hospital services. The province of British Columbia adopted the view that the primary diagnosis should be the cause of admission to the hospital. Listed below are the items which are transferred from the admission/separation record to magnetic tape of the hospital insurance service.

- Hospital identification
- Patient identification
- Residence
- Sex
- Age
- Date of separation (discharge)
- Date of admission
- Patient days
- Type of separation
- Primary diagnosis
- Secondary diagnosis
- Operations
- Accidents
- Responsibility for payment

Application of the data falls generally into one of three categories: morbidity, hospital planning, and special studies. The requirements of the first two, and to some degree the third, are fairly predictable within the range of available data so that certain tabulations are prepared routinely to minimize the number of special listings.

Hospital morbidity data is collected by each province in Canada but reported on a standard format for the purpose of providing national morbidity statistics. Consequently, from an abridged list of ICDA Codes, the current Canada list of 188 diagnostic categories has been developed. This list which was used for the first time in 1969 is a revision of the former list of 98 diagnostic categories. The standard morbidity tables used by the provinces are:

- Summary of hospitalization according to responsibility for payment as recorded by the province; discharges during the year and patient days since admission of these discharges.

- Hospitalization by sex and age for all persons hospitalized in the province.

- Discharges and patient days and corresponding rates, by size of community of residents, for all persons hospitalized in the province.

- Discharges and patient days by length of stay, by sex and age, for all persons hospitalized in the province.

- Discharges and patient days by primary diagnosis, race, sex, and age, for all persons hospitalized in the province.

- Number of hospital discharges classified by the unabridged diagnostic groupings – with and without surgery – and the number of discharges with selected related special procedures for all persons hospitalized in the province.

- Selected operations reported by related diagnosis by hospitals for all persons hospitalized in the province; number and discharge and rates per 100,000 population, number of related operations, and average stay of operations.

- Discharges, days of care, and average length of stay for the two-digit categories of operations, and treatment for all persons hospitalized in the province.

Under a program of comprehensive hospital care the British Columbia Hospital Insurance Service has been able to analyze the complete pattern of hospital care within the province. Data collected are primarily geared to hospital utilization of the provincial level. At the present time, it does not attempt to record or tabulate medical data required by medical utilization committees at the local hospital levels. However, there is still sufficient data to point out areas that may need to be investigated.

### 16. The Hospital Discharge Abstract System of the Saskatchewan Hospital Services Plan (207)

The Saskatchewan Hospital Services Plan began in 1947, replacing a patchwork of financial aid arrangements between the provincial government and the various hospitals as well as sundry municipal ventures aimed at paying for hospital service provided to residents. When the Saskatchewan Hospitalization Act was passed in 1946, there already existed a Health Services Planning Commission, and this body was given responsibility for administering the new act. In order to do this, a division was created, namely, the Saskatchewan Hospital Services Plan. SHSP had the following responsibilities:

- Registration of residents

- Collection of prescribed personal tax

- Handling claims

- Payment to hospitals

The interfacing of these four elements largely determined the data which needed to be collected. Modifications have occurred since, but the format of the present admission/separation form is derived largely from these early requirements of SHSP.

The emphasis was on the insurance aspect, verifying that the claim was legitimate on behalf of the fully paid beneficiary. Demographic variables, such as age, sex, place of birth, and marital status, and discharge diagnosis were recorded, analyzed and reported, but no responsibility lay with SHSP to become involved with the problem of quality of care. This responsibility lay with another governmental agency, namely, the Division of Hospital Administration and Standards. With the advent of universal and medical care insurance in 1962, another dimension was added to the provision of health care and a re-appraisal of the administrative channels, SHSP, and the Division of Hospital Administrative Standards were combined in 1964 into a new hospital branch. The major responsibilities of SHSP are:

- Registration of residents and to collect the joint hospitalization tax and medical care premium.

- To finance the operations of approved hospitals and to provide planning and financial assistance to hospital construction.

- To insure the maintenance of minimum standards of safety for inpatient care.

- To authorize the expansion, improvement and addition of programs in the hospitals.

The admission/separation record is submitted by the individual hospitals on the discharge or death of each patient, whether covered by SHSP or not. For SHSP cases, the eligibility of the patient is checked manually since it was determined to be more economical than computer checking.

All general hospitals in Saskatchewan are paid semi-monthly on the basis of a predetermined budget. Since there is no immediate payment for patient days, no purpose is served in issuing the hospitals with printouts of the discharges. Therefore, there is no continuing reporting to the hospitals on these. The discharge reports are used by program officers on SHSP who determine whether a hospital is running above or below the utilization level which has been predicted in setting its budget. Therefore, adjustments of rates may be made throughout the fiscal year. Annual reporting by SHSP is required by statute, and the data contained in the admission/separation record together with the financial data comprise the bulk of such reporting.

The advantage of the system is that a total experience is obtainable for a clearly defined population of approximately one million people. The major disadvantage is that the clinical variables are gross in the extreme – discharge diagnosis and type of operation and/or accident, if applicable. Therefore, the medical audit approach is capable of only limited application using the present admission/separation form. It is capable, however, of yielding such indices as the average days of stay by type of case and by age of patient for each hospital, and each admitting doctor. Such indices are useful in detecting practices which are grossly out of line and any finer clinical detail would require modification of the discharge form as presently constituted.

The government has an obligation to insure that a satisfactory level of quality is provided SHSP beneficiaries. One of the areas in which a modified control can be exerted lies in insuring that operative procedures are not carried out in institutions which do not have the facilities or supporting staff to adequately perform such procedures. This problem is particularly relevant in Saskatchewan because of its heritage of a multitude of very small hospitals. The discharge record serves as a basis for such control.

Presently in progress is a project aimed at linking the records of separate health programs which have been developed more or less autonomously over the years. Paralleling the hospital are two other major health programs:

- Provincial medical care insurance plan which is concerned with insuring of physician and optometrist services; and

- Provincial psychiatric programs which provide services to the province's population on inpatient and outpatient basis.

The point has been reached where patient records from these three major programs can be integrated and combined into a patient history. It is anticipated that other health programs as well as the vital statistics registration data can be incorporated into this overall health intelligence system.

The success of this particular project has underscored the point that hospital data are but one component of the total health profile of the community: refinement in the quality of the former leads directly to the clear definition of the latter.

### 17. The Patient Data Study of the American Hospital Association (66)

AHA's Patient Data Study was not developed as an operating system for the collection and descriptive use of patient information. The study was basically a methodologic research project on the collection and potential use of patient data for the purpose of hospital management. AHA faced three major questions regarding the collection of health information as a tool for hospital management. They were:

- What patient data items are most pertinent to the operation of an institution?
- How do you obtain an economically valid data on a regular basis?
- How do you interrelate items of patient and nonpatient data and translate them into management indicators?

In early 1966, the Bureau of Research Services of AHA undertook a methodological study to develop an economical and effective system for collecting valid data. The long-range objectives of the study were to:

- Develop a continuing program for the study of the effect of patient variables on the management effectiveness of hospitals.
- Increase the effectiveness of present operations in future planning through the use of a management tool developed with the combination of patient data and nonpatient data.
- Development within hospitals and related institutions of permanent relevant sources of data for management research purposes.

The study was designed to be carried out in four phases:

*Phase 1:*

Methodological development of a system of inpatient data collection.

*Phase 2:*

Research exploring the use of inpatient data for purposes of management measurements and improvements.

*Phase 3:*

Integration of the patient aspect into the Hospital Administrative Services Program (HAS).

*Phase 4:*

Expansion of the patient data program to hospital outpatient ancillary services and to services of related health care institutions.

The accomplishments of Phase 1 are listed in this section. Goals of Phase 1 were to:

- Develop a system of collecting valid patient data for research purposes.
- Test the system in a selected group of community hospitals.
- Code and process the data centrally.
- Make a preliminary analysis of the data, both alone and in combination with nonpatient data.
- Convene an advisory panel to evaluate findings of Phase 1 and to recommend a course of action for Phase 2.

The resource document for the collection of patient data for Phase 1 was a three-part discharge summary form. The Joint Commission of Accreditation of Hospitals was consulted regarding the discharge summary form and the form was designed to include the subject titles for compliance with their five points, which are:

- Why did the patient enter the hospital?
- What were the pertinent laboratory, X-ray, and physical findings?
- What was the medical and/or surgical treatment?
- What was the physical condition of the patient when he left the hospital?
- What instructions were given about further care?

The original copy was designed to be used as an integral part of the hospital medical record. The form includes a second copy for the physician. A third copy which was modified for confidentiality and ease of coding was forwarded to the AHA for processing.

The discharge summary offers certain advantages to the hospital and to the physician:

- Medical record simplification
- Utilization review
- Continuity of care

Twenty community hospitals that were participating in the Hospital Administrative Services program participated in the field testing of the form. These hospitals ranged in size from 66 to 381 beds, 12 of which had less than 150 beds. They were geographically located across the United States. At the conclusion of the test, 8,788 summaries had been received from the hospitals. Documents were edited and coded centrally by a team consisting of two medical record librarians and two senior medical students. Seven major reports were prepared:

- Distribution of discharges by hospital by age.
- Distribution of discharges by hospital by days of stay.
- Distribution of discharges by hospital by history of previous admission.
- Distribution of discharges by hospital by principal diagnosis.
- Distribution of discharges by principal diagnosis by days of stay.
- Distribution of operations by hospital by type of operation.
- Distribution of discharges by hospital by course of patient.

A report detailing clinical information on patient stays of over 15 days in seven of the hospitals summarized data on principal diagnoses and operations and a report in graph form on the distribution by age, operation and days of stay.

After review by the advisory committee, the following analyses were recommended to provide a basis for isolating critical patient variables among the hospitals:

- Length of stay patterns by age, sex, diagnosis, presence of 1 to 3 associated diagnoses, and disposition of the patient.

- Special breakdown of stays under three days and over fifteen, by age and diagnostic category.

- Length of stay breakdown for all surgical cases by the number of days pre-operative and post-operative.

- Consultation rates for 10 well-defined diagnosis categories.

- Percentage of autopsies, overall and by age of patient and diagnosis category.

- Patients readmitted by age category, omitting the expired cases.

- Coronary cases relating to the length of stay and further related to the number of coronary deaths by age of patient.

- Comparison of above length of stay to non-patient data where appropriate.

### 18. The National Hospital Discharge Survey (114)

This survey is an integral part of the National Health Survey System administered by the National Center of Health Statistics. Three elements of the National Health Survey include the Health Interview Survey (HIS), which is a continuing, national sample survey of the health of the non-institutional population as reported by household members; the Health Examinations Survey (HES), which is also a continuing, national non-institutional sample but for which the relevant health of the population is measured and reported by a team of medical professionals and a system of Health Resources Surveys (HRS) covering the characteristic utilization by both the institutional and non-institutional population of the nation's health man-power and health facilities. All three of these, in varying degrees, are capable of measuring morbidity in the non-institutional population but only HIS and HRS are designed to measure morbidity associated with hospitalization.

To provide more complete and precise information on the utilization of the nation's hospitals and on the nature and treatment of illness among the hospitalized population, the NCHS began in 1962, an exploration of the possibilities for surveying morbidity in hospitals. After assembling an advisory group and reviewing the study done by the School of Public Health of the

University of Pittsburgh, and with the advice and support of the American Hospital Association, American Medical Association, individual experts, elements of the Public Health Service, the National Hospital Discharge Survey was started in 1964. As presently arranged, the National Hospital Discharge Survey is national in scope, continuing in nature, concerned with the general, short stay, non-federal hospital only, and based on existing hospital discharge records. In addition to this information on the hospital and its record keeping system, the survey obtains information on the demographic characteristics, length of stay, discharge status, final diagnoses, and surgical procedures from the National Sample of Discharges from short-stay hospitals. The demographic information consists of sex, data of birth, age, race, and marital status. Length of stay is calculated as the difference between the recorded dates of admission and discharge. Discharge status indicates whether a patient survived or died during the hospital stay. The final diagnoses or surgical procedures for each hospital episode are those listed on the face sheet of the hospital medical record. They are then transcribed to an NHDS form verbatim and in the same sequence as they appear on the face sheet.

The survey sample consists of one certainty panel of *all* hospitals with 1,000 or more beds in 1963 plus 9 other panels, each of which is a national sample of hospitals with fewer than 1,000 beds. When properly inflated each of the 9 sample panels, or combinations thereof, when added to the certainty panel, are statistically representative of all short-stay hospitals in the United States.

Most of the problems of the survey are so interrelated that it is virtually impossible to create a system whose components are mutually exclusive. The types of operational and medical problems are described below.

Operationally, it has been difficult to develop an adequate definition of hospitals for the survey. Other non-medical problems include or have included processing difficulties, especially with regard to the optical scanning form; the item on race; on the ever-present NHDS staffing problem for analyzing the accumulated discharge data.

Primary among the medical problems of the survey is that related to first – and all – listed diagnoses. About 40 percent of the discharges and probably more than 70 percent of the survey processing effort and cost relate to these multiple diagnoses. This becomes a problem in those cases where the attending physicians elect to list more than one diagnosis on the face sheet of a hospital discharge record. Some physicians will record a maximum number of diagnoses per patient, while others are more terse in filling out the face sheet of the medical record. The problem becomes even more complex when surgical procedures are involved. Most hospital records do not specifically relate surgery to diagnosis or to length of stay and while this is virtually or usually apparent, there are enough variants so as to confuse the statistical picture.

The conceptual and operational problems of multiple diagnosis make it difficult not only to tabulate diagnoses and surgical procedures in a meaningful fashion, but also to analyze and to evaluate the resultant data. The potential multiplicity of certain conditions and the unitary character of others may result in overcounts of the former and undercounts of the latter, e.g., one hospital episode of cancer may include several diagnoses of malignant neoplasms covering all affected body sites, whereas an episode of mycardial infarction will obviously include only one such diagnosis and only one site. The situation is further complicated in that the survey data are cumulative for each calendar year. Therefore, medical conditions requiring repeated hospitalizations in a given year may overpresent both that condition and the involved patients, as against those patients with more or less one-time hospital conditions.

The data from a survey are in demand by both government and private sources. The Social Security Administration has used them to validate their own data. Numerous requests for published and unpublished data have also been received from the National Academy of Sciences, National Heart Institute, Chronic Disease Control Programs, various state agencies. In the private sector, numerous requests to have been received for general and specialized discharge data including medical supply and marketing research organizations, pharmaceutical companies, tobacco industry and life and health insurance interest.

During the past few years, the survey data collection and processing system has been developed and improved. Seven reports, based on non-medical data for 1965, have been published and distributed. During 1968, medical data for the 1965 discharges became available for analysis and in 1969, non-medical data for the calendar year 1966; and in 1970, the remaining medical and non-medical data for the years 1966-1969 became available to the public.

### 19. Hospital Discharge Data Collected by Blue Cross (84)

Blue Cross Association together with its 80 Blue Cross plans, have routinely collected patient discharge statistics and related hospital charges and cost data. These data, which are abstracted from patient medical and business office records, are reported to the Blue Cross Organizations through claims forms and periodic audits. Such information includes the following:

- Name of hospital or provider of service.
- Name, age, sex, marital status, and residence of patient.
- Industry in which the patient is employed.
- Attending and referring physician.

- Admission and discharge dates.
- Type of hospital accommodations.
- Discharge status.
- Admitting and discharge diagnoses.
- Ancillary services received.
- Charges for services rendered.
- Various categories of hospital costs.

Once the data have been collected, they are processed for:

- Administration of plan activities.
- Management of national accounts.
- Actuarial rating of new and extended and medical care benefits.
- Claims and utilization review.
- Data services for utilization review committees.
- Research.

Because of Blue Cross's awareness that programs of continued research and evaluation are essential to the solution of the problems of the health care system, it has led to the establishment of a major discharge data research program called the National Health Care Utilization Study.

The study is an ongoing research program that establishes a medical care utilization data base for a national sample of approximately 50,000 Blue Cross contracts or about 150,000 members. The data base is composed of enrollment information and utilization information of Blue Cross benefits obtained from the claim form discharge data. The primary purpose of the study is to ascertain variations in hospital and other medical care utilization and to identify and study the major factors influencing this variation.

Because of variations and inconsistencies in hospital discharge and subscription information, they can not be combined on a national basis. These inconsistencies are broadly categorized as problems in recording utilization, enrollment counts, definitions and the detail in which the information is obtained and processed.

In regard to utilization, some plans tabulate the number of discharges on an incurred claim basis, while other plans consider only paid claims in their utilization experience. In addition, some plans may consider all admissions or discharges by an individual during a defined interval as one discharge. Conversely, it is possible at some plans, that they will report a continuous stay as more than one discharge if the stay is through several health facility billing periods.

The primary problem in determining Blue Cross enrollment is the availability of information and the method by which such determinations are made. Some plans use contract holder and the department information available in their status files, which may or may not be current. Other plans use such status supplemented by special study. To complicate this, there are a number of plans which do not maintain any data for dependents. For these groups, enrollment counts generally are obtained by multiplying the number of active contracts in force by an estimated average family size.

Apart from these inconsistencies, is the fact that many plans do not tabulate enrollment and utilization by age or sex. They do not adequately link discharge data or utilization experience to specific members in the family. Finally, plans generally do not maintain utilization information in excess of 18 months.

Through the National Health Care Utilization Study, which has established a file containing contract and subscriber information and the utilization file, nearly all the shortcomings of the inter-plan data can be eliminated. The following are the data to be collected in the study:

- Blue Cross contract classification (group, non-group).
- Benefits available (basic contract including riders).
    - Number of days
    - Deductible clauses
    - Co-payment requirements
    - Co-insurance features
    - Hospital room allowance
    - Inpatient laboratory and X-ray examination
    - Inpatient drugs and medications
    - Anesthesia administration

    - Maternity allowance
    - Number of hospital days, nervous and mental conditions, convalescent care
    - Various outpatient services, including psychiatric care
    - Maximum age for dependents

- Name, birth date, and sex of contract holder and dependents.

- Name of patient.

- Date of admission or service.

- Place of treatment.

- Type of treatment.

- Hospital or physician number.

- Discharge diagnosis.

- Number of days or visits paid.

- Charges.

    - Room and board
    - Drugs
    - X-ray
    - Laboratory
    - Other
    - Total

- Total charges covered under Blue Cross.

The type of information to be tabulated and disseminated on a regional national basis is listed briefly as follows:

- Total Blue Cross membership by age, sex, contract type, and benefit level.

- The extent of changes from one contract classification to another.

- Hospital admission rates and average length of stay by age, sex, diagnosis, contract classification, benefit level, place of treatment, and type of treatment.

- Distributions of various lengths of stay for selected diagnosis.

- Information concerning hospital use and repeated hospital use within a specified time interval, and on an individual and family basis.

- Analyses of possible differences in hospital utilization by type of hospital.

Furthermore, the establishment of a data base will permit special surveys concerning determinations of selected characteristics of the Blue Cross population and out-of-pocket medical care expenditures, including those related to hospital use beyond the number of contract days of care.

The principal problems encountered in setting up the study was determining the extent to which the required discharge data were available, and the systems that plans could use to report such data. Also, it was known that there were regional differences in definition. To clarify these problem areas, a group of personnel from ten plans assisted in resolving the differences, setting up a glossary of terms, formulating a compatible set of codes, and suggesting a general data processing system. Two major limitations of the system concern the inability to determine if the data submitted to Blue Cross are completely accurate and the fact that the study was presently restricted to Blue Cross only. In regard to the former, it is possible that incorrect data will be reported which will pass the edit checks. Special studies have been planned to ascertain the extent of errors.

When the study was planned, it was felt that a more meaningful medical care utilization information base would result if Blue Shield as well as Blue Cross data were obtained. However, Blue Shield was not included since it would have significantly delayed getting the study underway at the earliest possible time. The primary advantage of the study is that national data will be available concerning the type and extent of medical care utilization on a longitudinal basis by age and sex under various Blue Cross contracts. Furthermore, a data base will be established that permits special study of the various components of the Blue Cross population.

The national and regional data to be collected, tabulated and analyzed will provide Blue Cross, hospitals, health insurance organizations, health, welfare and planning association, governmental agencies with accurate information required for planning and policy determination. The information in conjunction with similar available data can be used to:

- Identify individuals with unmet hospital needs.

- Understand current and predict future hospital requirements.

- Develop new and extended benefits.
- Prepare utilization profiles by diagnosis, age, sex, type of hospital.
- Study the possible effect of the day of the week on length of hospital stay.
- Study variations and trends in hospital charges by diagnosis.
- Study variations in hospital utilization by type of contract and benefit level.
- Determine the extent of multiple hospital admissions during the stated time interval on a family and individual basis.

## III. UNIFORM HOSPITAL DISCHARGE DATA SET (110)

### A. PURPOSE

Following the Airlie House Conference Report, a Steering Committee was established by the National Center for Health Services Research and Development, to investigate the objectives set forth by the Conference (to be discussed later). The National Committee on Vital and Health Statistics was charged with the establishment of a subcommittee to study the uses of hospital discharge data in detail and to recommend the items of information which were necessary for a basic minimum data set and the definitions and classifications to be applied in recording the information.

In January 1970, the NCHSR&D awarded a grant to the Health Services Foundation and to the Blue Cross Association for a two-year (January 1970 to November 1972) demonstration project for the development and implementation of a uniform hospital discharge data format. The project was charged with carrying forward the following objectives:

- To identify and define the minimum uniform basic data set that could be used in hospital discharge abstract systems; to improve and coordinate health data collection; and to provide basic information which can serve a variety of functions. These functions would include: patient management, hospital management, health planning activities, health services, and epidemiological research, and insurance claims processing.

- To identify organizations as well as the collection and processing of patient discharge information in the United States.

- To implement tests in various locations to establish the feasibility of collecting the basic set of data in a uniform manner.

- To provide the interregional exchange of data using a clearing-house approach.

Information on patients discharged from hospitals is presently being collected in a national sample by the hospital discharge survey which was previously discussed. One study, done by the Hospital Research and Educational Trust and the American Hospital Association (115) indicates that there were 87 agencies that repeatedly collected discharge data. Health data abstract agencies, which comprised 7 of the 87 agencies, processed the largest number of inpatient hospital discharges per year (14.4 million).

The other agencies that routinely collect hospital discharge data are included in the following categories:

- State and local health departments
- Areawide health planning agencies
- Regional Medical Programs
- Blue Cross plans
- Insurance companies
- Hospital associations
- Medical organizations
- Medical education institutions
- Paramedical education institutions

Some items of information about discharged patients are essential to nearly every stated use of the data, such as diagnoses and procedures. Other items are essential for particular uses of the data, but either unnecessary or of limited value for other uses, such as marital status or date of procedure. The decision to include an item of information in the data collected by an abstract agency rests on the judgment as to its necessity for particular purposes and the relative importance of those purposes. The multiplicity of organizations which collect these data, sometimes without regard to common information assembly and interpretation, causes major differences as to what items are to be collected and to the precise meaning of these items. Due to this lack of standardization, comparability of data collected is extremely limited.

## B. UNIFORM HOSPITAL DISCHARGE DATA SET

After intensive study (110), it has been proposed that at least a "minimum data set" be gathered routinely for all hospitalized patients. The Uniform Hospital Discharge Abstract Data Set is such a *minimum basic data set* and its vocabulary is defined in terms of data information on the health care delivery system:

- *Uniform* – always having the same content, not varying, consistent, undiversified, conforming to one rule.
- *Hospital* – an institution where medical care is rendered.
- *Discharge* – information about a patient and his episode of illness which was summarized in the hospital medical record.
- *Minimum* – the least number of information items.
- *Basic* – essential for use by hospital administrators, planning agencies, medical staff, third-party payers and others.
- *Data set* – items of information summarized from the hospital medical record often contained in the discharge abstract.

The Subcommittee of the National Committee on Vital and Health Statistics suggested that the following items be included in any minimum basic data set:

- Hospital identification
- Person identification
- Date of birth
- Sex
- Marital status
- Race

- Residence – zip code
- Admission and discharge date
- Physician identification
- Diagnosis
- Procedures
- Service to which the patient was admitted
- Disposition of patient
- Principal source of payment (anticipated)
- Charges (total)

It was recognized that for certain purposes, primarily for patient management, this data set would be the focal point for further study instead of yielding every bit of information that might eventually be required. In addition, the minimum data set might have to be augmented to serve special needs in local areas.

## C. USES OF THE MINIMUM BASIC DATA SET

The establishment of such a minimum basic set of uniform hospital discharge data would permit accumulation and comparable patient information. The principal institutions and agencies requiring access to information on health and hospital care programs, services, utilization costs, include:

- Hospitals
- Local, state, regional and federal health planning agencies
- Official agencies for funding and licensure
- Third-party payers
- State and federal legislatures
- Universities and other groups involved in research

Accurate and comparable data are needed in forms that are adaptable to a variety of purposes which include:

- Common claim information
- Community health planning
- Evaluating patterns of patient care and providing a basis of continuity of care and allocation of services among institutions
- Epidemiological studies
- Predicting the impact of health care innovation, such as rearrangements in technology
- Internal management and analysis of Health Maintenance Organizations and external evaluation by regulatory agencies
- A minimum utilization review within hospitals
- Quality assurance and peer review

With regard to the last item on peer review, hospital discharge abstract and the data generated from them have long played important roles in utilization review activities of hospitals. Hospital discharge abstract data, which can be formally defined, has contributed to peer review activities by allowing comparison with patient care patterns in other areas of the country, or within the community and in the hospital itself. Collected on all discharged cases, these data provide a framework for the selection of cases for more detailed study. Furthermore, as similar uniform data sets are developed for nursing homes, physician's offices, and other delivery areas, the total health quality assessment within a community becomes more feasible. Also, the use of a uniform hospital discharge abstract data set could be substituted for items now called for on a third-party claims form, which would reduce administrative expense and claims data requirements.

## D. REQUIREMENTS FOR IMPLEMENTATION

The Steering Committee on Uniform Hospital Discharge Data recognized the following to be items of concern in introducing this concept:

- Resistance to change
- Confidentiality of patient data and physician data

- Institutional changes
- Existing abstract data system
- Third-party payers
- Cost

Prior to the adoption of the minimum basic data set (or adjustment of existing data set for conformance) sponsoring organizations must assure themselves of the cooperation of all parties who would be effected by the implementation. These include:

- Participating hospitals
- Discharge data collection agencies
- Medical societies and hospital medical staffs
- Third-party payers
- Areawide health planning agencies
- Regional Medical Programs
- Hospital associations
- Health education institutions

It has been estimated that these activities could take up to three months or more of consistent effort before the sponsoring organization could begin a process of implementing a uniform hospital discharge abstract data set.

The following preconditions will need to be addressed before the first day of operation. They are:

- Negotiations with existing abstract agencies for acceptance.
- Discussions with third-party payers for the possible use of data set in a claims form.
- Education of hospital personnel as to the nature and importance of the project.
- Coding and computer programming adjustments.

- Development of new forms and procedures.
- Training of hospital personnel with respect to the data items, definitions, forms, data gathering techniques.

It has been estimated that the time needed for installation is dependent upon the sophistication of the hospital's current data gathering activities, presence of abstracting agencies, and the processing and servicing capacity in the area. It has been estimated that adjusting the data requirements of the uniform data set will take between 6 and 12 months in the area that is currently served by hospital discharge abstracting agency. If such an agency is not available, more time would necessarily be required.

## IV. COMMON DATA SET FOR HOSPITAL MANAGEMENT (118)

### A. PURPOSE

During 1970, the NCHSR&D contracted with the Hospital Research Educational Trust (HRET) and the American Hospital Association to design and develop areas of information that would further assist the implementation of the Airlie House Conference recommendations (to be discussed later). The HRET contract which was entitled "Common Data Set for Hospital Management" had three main objectives:

- To determine the present state of collection and use for the basic data set, or of most items of the set, by hospitals, including both those who subscribed to a collecting reporting system and those that do not.
- To determine the capability of hospitals to collect and use all or most of the data set items if not presently doing so.
- To propose and/or devise training programs for staffs in institutions not presently collecting and using the basic data set in order to bring them to a level of capability that would allow them to do so.

The contracts with both the Health Services Foundation (HSF) and the Blue Cross Association (previously discussed) and the Hospital Research and Educational Trust were developed to assist in the implementation of the Hospital Discharge Abstract Systems Conference recommendations. The contracts interrelate in the following way: The focus of the HSF contract was on existing discharge abstract systems and their capacity to collect and use the basic data set, as well as to demonstrate innovative uses of the data primarily by agencies external to the hospital; the focus of the HRET contract was on hospitals and their capacity to collect and use the basic data set, as well as to propose methods of teaching hospitals how to develop and use this capacity, if non-existent.

Five steps were taken by HRET to develop the information base required to accomplish the objectives of the contract. They were:

- A sample of community hospitals were surveyed by mail to assess the capability of those hospitals to collect and use the basic data set, as well as to provide insight into their present methods of discharge data, collection and use.

- Allied hospital associations were surveyed to determine their actual or planned involvement in new or existing hospital discharge abstract systems.

- The hospital discharge abstract systems that were identified by the Health Services Foundation were requested to furnish lists of their subscribing institutions in order to provide a precise, quantitative measure of the number of hospitals actually participating in these programs, as well as to provide a means for studying characteristics of system participating institutions.

- Data produced by the above described methodology were analyzed to determine the characteristics of their potential subscribers for the educational program. Informal conferences were held with education specialists to determine methods, both innovative and traditional, for conducting such an education program, and field visits were made to existing discharge data systems to determine their methods of training personnel in hospitals participating in their ongoing systems.

- A short conference was held, with selected participants from the original hospital discharge abstract conference, to obtain advice and recommendations concerning the development and progress of the contract.

The inquiries to community hospitals, hospital associations and discharge abstract systems provided information to fulfill the first two contractual requirements. Site visits and informal conferences provided the basis for fulfilling the third contract requirements in development educational programs. A final conference assisted in accomplishing all three tasks.

## B. FINDINGS

The impetus for the contract originated from the Airlie House Conference on Hospital Discharge Abstract Systems, and the data set on which the HRET contract focused was originally developed primarily for use by abstracting systems. This contract, however, focused primarily not on abstracting systems, but on individual hospitals which may or may not participate in such systems. As a result of the differing universe, there are certain considerations concerning data recording and collecting that may not be likely to be present when all systems are considered.

The medical record of the individual patient is considered the primary document within the hospital but should contain at least the information required by the uniform data set. For reasons of economy, continuity, validity, and reliability, the record was viewed as being the ultimate storage point. It is from this source that data can be extracted for both internal and external institutional uses. The theoretical logic of this concept does not hold when confronted with the real world of hospital organization. For example, total patient charges are not normally recorded as a data item in a medical record, but are a basic and integral record item within the accounting office of the hospital. Furthermore, the utility of correlating data on charges with selected items of the medical record in large numbers of hospitals has not yet been demonstrated. There are two questions posed by this situation; namely:

- Is the medical record used as the ultimate storage point for all present and future items of the data set, or
- Is it sufficient to assure that charges and other similar items are routinely available within the hospital, or recorded according to prescribed standards and definitions, and can be linked with the medical record when necessary?

Affirmative response to the first item would require an internal systems change that could grow to be expensive and somewhat inaccurate. Positive response to the second item would require relatively little change in existing methods and probably little additional expense. This discussion was used only as an example to underscore the basic consideration set forth in the two primary questions posed.

Existing systems require that participating institutions abstract the required data and forward it to a central location for processing. As findings demonstrate, the large proportion of institutions do not currently participate in discharge abstract systems, although many of the non-participating institutions routinely abstract medical record data for their own internal use. This significant number of non-participants must be considered in the further development and use of the data set, for systems uses and institutional uses may be at considerable variance and ultimately effect the goals of a uniform data set.

The following is a summary of the HRET contract findings:

- *Recording of Uniform Data Set Items.*

  The community hospital study appeared to conform favorably to the requirements of the 18 elements of the common data set. At least 95 percent of all hospitals record the following 10 items:

  - Patient identification
  - Date of birth
  - Sex
  - Admission date
  - Discharge date
  - Attending physician
  - Operating surgeon
  - Principal diagnosis
  - Other diagnoses
  - Surgical procedures.

  At least 85 percent record the following three items:

  - Marital status
  - Other procedures
  - Patient disposition

  At least 70 percent record race, zip code, and source of payment and less than 70 percent of the hospitals record only two items of the set:

  - Admitting service
  - Charges.

  The instances of nonrecording relate more to problems stemming from the definitions of the data set, and its newness and unfamiliarity, than to problems stemming from the hospital medical records in general.

- *Face Sheet as Central Recording Source*

  There was an increasing tendency for the face sheet of the medical record to be used as an administrative document as opposed to one for medical care appraisal. The Common Data Set is comprised of medical items of information. As a result of the change in the orientation of the recording on the face sheet, the total array of documents on the medical record would have to be used to obtain data set items, rather than the face sheet exclusively. However, at least 90 percent of the hospitals commonly record 6 items of the set routinely on the face sheet.

- *Disease and Operation Coding Systems*

  There is a wide variation of the system used (7 different systems were reported), and at least 15 percent of the hospitals used more than one system of coding.

- *Hospital Membership in Discharge Abstract Systems*

  Slightly more than one-fourth of all community hospitals were members of at least one abstract system, but these system members account for almost 40 percent of all community hospital beds. This is illustrative of the fact that the membership of existing systems tends to be drawn from the larger community hospitals, especially those with over 200 beds. The tendency for larger hospitals to elect a joint abstract system is true for all the larger categories of the hospital size, except for the largest (500+). As a correlation to the large size, hospitals participating in the systems have a greater proportion of approved medical educational programs than do hospitals not participating.

  The data recorded on the medical records of these hospitals participating in these systems may not totally conform to the requirements of the Common Data Set, but they must conform to the data requirements and definitions of the abstracting systems. Changes in the recording of the data set of these hospitals must therefore be approached through the systems organizations rather than through the individual hospital organization.

- *Hospitals with Individual Systems*

  Over 40 percent of all community hospitals have designed individual abstract systems for their own internal use, although they do not participate in a group system. Hospitals with less than 200 beds and with those with 500 or more tended to favor this type of system over existing groups. In terms of individual items abstracted, there is considerable variation among the hospitals; but at least half of the institutions routinely abstract 11 of the 18 data set items.

- *Hospitals Not Using Any Type of Abstracting System*

  Almost one-third of all community hospitals report that they neither belong to an existing hospital discharge abstract system nor routinely abstract medical records' data for their own internal use. Practically all these hospitals have less than 100 beds. There is no hospital with more than 200 beds that does not use any type of system for abstracting medical record data items.

- *Use of Data Items Abstracted from Medical Records*

  Hospitals belonging to abstract systems and/or using their own internal method report a wide range of functional uses of items abstracted. The most frequently occurring uses are for purposes of indexing in registries and of patient care review. Despite the fact that over two-thirds of the hospitals participate in some type of abstracting, there are indications that there is a wide range of possible functional uses. The number of hospitals actually using the abstracted data beyond the traditional indexing and patient and medical care review is minimal. Among hospitals which develop their own system, half of the functions reported were used by less than 50 percent of the hospitals. The same pattern was observed in the group systems hospitals.

- *Allied Hospital Association Involvement in Discharge Abstract Systems.*

  Over one-fifth of the allied hospital associations indicated some degree of involvement with discharge abstract systems. Most of the associations reported involvement with new or developing systems. Twelve associations indicated involvement, but eight additional groups indicated that serious planning was under way for development of new systems at both state and metropolitan levels.

## C. HRET RECOMMENDATIONS

1. It was recommended that action be taken by appropriate national organizations to disseminate information on the uniform data set and definitions to health care institutions. Further relevant educational activities should be undertaken in these institutions to insure that data are collected and that the collections are appropriate in terms of both quality and quantity.

It was found that the majority of institutions appear to be collecting most items on the data set, but they were not necessarily using appropriate definitions and/or data categories. It was believed that general and continuous dissemination of information and educational activities may overcome this problem.

2. It was recommended that certain items on the data set be reconsidered by the developing organization. This reconsideration is focused both on the required items of the set and on certain definitional areas.

   It was found that certain items of the set are inappropriate in the medical record (e.g., charges). Certain items that are not set down on the record can be made available through it (e.g., zip code).

3. It was recommended that an investigation be undertaken to determine the functional uses of the abstracted data, especially observed in the low use areas (i.e., administration and planning). Uniformity in recording is basically important only when the items recorded are used. The level and types of use for the items did not appear to justify the major effort to institute uniform recording without participation of functional uses.

4. It was found that 32 percent of the hospitals reported that they make no use at all of the data abstracted from medical records. On the assumption that positive action has been taken on the previous recommendation, it was recommended that attention be given to institute a system of uniform reporting, and implementation of means and purposes of using the data set in these hospitals.

5. It was recommended that appropriate national organizations be urged to attempt to bring about uniformity in the codes used for recording diseases and operations and to move hospitals toward common use of a unit record system.

6. It was recommended that a periodic survey of allied hospital associations be continued to determine the extent of change occurring in their participation in hospital discharge abstract systems. The information provided in a survey should include a description of the nature of the involvement in information concerning the content and organization of the system.

7. It was recommended that more positive steps be taken to set up an information exchange among the associations concerning abstract systems. It was believed that the experience of currently active associations could greatly benefit those other groups currently considering development, and could motivate other associations toward its involvement.

8. It was recommended that a study be conducted to identify factors related to hospital nonparticipation in existing discharge systems. It was assumed at the Airlie House Conference that the maximum benefits from uniform data would accrue to hospitals participating in the system, rather than operating independently. If the maximum benefit is to occur, the number of system hospitals should be increased. To accomplish this change, it must be determined why certain institutions do not now join systems, and why certain institutions join systems and then terminate membership. If factors creating the failures are determined, it would then be possible to institute system changes to overcome the resistance to membership.

9. It was recommended that further information be gathered on demonstrated institutional benefits of present membership in discharge abstract systems.

10. It was recommended that an educational program be established for three categories of learners:

    - Physicians and administrators

    - Medical records librarians or other persons who will have direct responsibility for bringing out changes

    - Clerical workers to be trained and retrained

11. It was recommended that a study be conducted to determine the value of a uniform data set internal to an institution.

12. It was recommended that a group of institutions be selected from the universe to serve as demonstration hospitals for the uniform data set.

## V. AMBULATORY HEALTH DATA SYSTEMS

Based on prior experience in the conduct of research and administration of ambulatory services, it has been recognized that there is need for improvement in the methods of collecting and processing data in this setting. Existing clerical and clinical records have proven to be inadequate for the purposes of either program planning or research. Special surveys, sampling techniques and questionnaire interview methods which were characteristic of earlier attempts to obtain data for the analyses of ambulatory operations are now too costly and time consuming to permit continued study and review of this most important area of medical care. This section of the paper is intended to describe several efforts in obtaining patient data on ambulatory care for administrative, peer review, and research purposes. The descriptions that follow are intended to provide an overview of differing approaches of various operations and is not intended to be a complete inventory of ambulatory health data systems. The tendency for ambulatory services to be institutionally or group-practice based has placed increasing emphasis on the medical record as the central instrument for continuity of care. The record itself is the most viable source of data for peer audit and evaluation and for rational patient and administrative management. In recent years, the computer has been used in the processing of medical records to serve these functions. While some computer systems have been developed with extensive data bases on a limited number of patients which either help to manage single disease ease entities or to help teach in guide clinical care delivery, other systems with limited data bases have been developed on large populations to facilitate administrative planning and epidemiological and clinical research.

## A. THE BASIC NEIGHBORHOOD HEALTH CENTER DATA SYSTEM (198)

The basic neighborhood health center data system is a fully operational information system consisting of three data collection forms and a set of computer programs designed for comprehensive ambulatory health facilities. It was developed by Biodynamics, Inc. under contract B89-4368 with the Office of Economic Opportunity. The system measures characteristics of families and patients being served in addition to the services received. These data are recorded and processed using an integrated information approach, where a variety of uses and functions can be served by one system.

This health information system is based on a systems analysis of patient flows and program goals from a number of OEO neighborhood health centers. It is not based on either inpatient procedures of health care delivery nor on traditional outpatient procedures. It was designed to assist individual centers in improving their ability to deliver ambulatory care on a community basis and to guide them into relatively new fields of operations research, computers, and systems analysis as well as biostatistics. The system was also designed to gather comparable data from all centers in the OEO program to:

- centrally monitor the system
- investigate different modes of outpatient health care delivery

- analyze the ability of the health centers to deliver comprehensive family oriented care.

The development of this data system began over four years ago when there were no operational automated ambulatory care data systems, with the exception of special research projects. The goal was to provide an operationally useful and replicable data system for ambulatory facilities throughout the United States. There was no desire to re-invent the wheel; and reviews of the literature and site visits were made of supposedly operational data systems in the ambulatory care arena. The review did not uncover a single system which was either fully operational or replicable. Furthermore, the data being collected were not compatible and did not have appropriate denominators. Few facilities used the same definitions of such basic terms as registration and visit, or knew the age-sex distribution of individuals registered for the service in their institution.

For these reasons, Biodynamics undertook the development of this system. Since there was no system which could be adapted to neighborhood health centers, OEO sponsored the development of this health information system with the charge that it must be both basic and replicable. The primary objective resulting from the basic neighborhood health data system was to supply information that administrative and medical directors of these facilities need to efficiently operate their programs and provide high quality care to their patients. Two other issues that were addressed were the cost of providing these services to individuals and families and the development of data for a setting of capitation rates under a pre-paid system.

The components of the system are the registration and encounter forms and the computer to process the information on these forms in various outputs for various users. These components form an integrated information system through the collection of basic input data and the use of modular design techniques. The system is an integrated one in two ways: with respect to those whose needs it serves and with respect to the functions it performs. The system serves the needs of the health programs themselves while simultaneously providing the information needed by OEO to effectively monitor and evaluate the neighborhood health center program. In addition, it is a single system having five functions:

- Basic utilization and registration statistics
- Management monitoring and control information
- Billing information

- Program evaluation and planning information

- Research and reports

Basic input data are collected in such a way that all of these diverse outputs can be produced by one system. There are no separately collected data to serve the needs of just one of the five functions or to meet the reporting requirements of one group. All input data are processed and maintained in the basic form so that they can be aggregated as needed to serve various functions of users. Data collection concentrates on basic, generic, non-duplicated, and accurate input data; computing processing concentrates on editing, storing, merging, aggregating, analyzing, and displaying the data.

The components of the system are modular in order to insure that the system will suit the needs of various ambulatory health care facilities in an integrated manner. Items of information or entire data collection forms, as well as computer programs and outputs, can be added to, or deleted from the basic system as a core, resulting in small or dramatic changes in the scope of the system. Essentially this means that the system has the capability to be tailored to each health care facility's informational needs, without recourse to the non-integrated approach of using a separate system to produce output not produced by the standard basic data system.

The three data collection forms used in the basic system are:

- Family registration form

- Individual registration form

- Health services encounter form

The family registration form is used to enroll a family for health care in the neighborhood health center. It is used to collect information about the family as a unit, to determine a family's eligibility for care, and to assign a family identification number (and family member numbers) to an eligible family. A family is defined to be two or more people living within one housing unit who are related by blood, marriage or adoption, and one person living without relatives. Socially-related individuals who are economically dependent on the head of the family and foster children may be considered part of the family if a center wishes to do so. The family registration form is completed only once for each family, and the data on it are not collected again after each individual in the family is registered.

The individual registration form is used to register separately each member of the family for health care by recording only data which are specific to that individual such as name, date of birth, and sex. The individual registration form can also be used to: notify the medical record section to start a medical record for a new patient; initiate the preparation of the patient's plastic identification card; and, schedule an appointment for the initial health assessment.

The health services encounter form is used to collect data on health services provided or ordered at the center. One copy of the health service form is completed for each encounter. An encounter is defined as a face-to-face meeting between a patient and a health care provider, that results in the delivery of a significant service to the patient.

This health services form purposely calls for a limited but very useful amount of health services utilization data so that a center can quickly initiate the systematic collection of such data. It concentrates on collecting the highlights of services provided a patient rather than recording every detail of all services rendered.

The data collection forms share the following design features:

- Ease and dispatch of filling out and handling
- Usefulness to the center
- Suitability for economical, computer processing
- Flexibility for accommodating special centers

The basic systems computer processing component contains a set of eight programs for processing the registration and health services data collected on the three forms in the system. The programs create and update computer files, error-check incoming data, produce lists of information, and compute statistical tables. They usually run for monthly and quarterly reporting periods, but can be run for any special needs.

Computer files containing registration and health services data form the center's data base. Error messages are produced for feed back to the center personnel who fill out the forms, as part of a continuing training program to assure the accuracy of input data, and long-term effort to maintain an accurate data base. The output lists and tables are extracted from the data base to accomplish the five functions of the system:

- Basic utilization and registration statistics
- Management monitoring and control information
- Billing information
- Program and planning evaluation
- Research and reports.

These outputs are in a form suitable for operational use as well as for direct inclusion in reports.

In addition to the standardized lists and tables of the basic system, the data base itself also provides a source of additional information for any center. It is possible to enhance the usefulness of the basic system once the center has established an adequate data base by tapping that base in different ways in order to:

- Produce additional tables cross-relating or summarizing any of the data in the base into different ways as dictated by the needs of the center
- Produce additional lists of information
- Select samples, either randomly or based on selected criteria
- Perform special analyses or studies.

The standard outputs of the basic system are:

- The data base, consisting of updated family and individual registration and health service encounter files
- Error messages
- Four lists
- 32 statistical tables

Each time the data base is updated by the addition of new registrations and by the incorporation of changes for old registrations, such as error corrections, completely new lists of patients and families are produced for administrative and operational use by the center personnel.

The 32 standard statistical tables of the basic system provide multi-dimensional family registration, individual registration, and health services tabulations that contain more information than are provided by most common one-dimensional tabulations of key punched data. Ten of the tables are cross-tabulations on the family registration form. The family registration tables provide a geographic, economic, and profile of the families reached by the center. The profile can be monitored from time period to time period, spot trends or sudden changes, and can be compared to survey and census data for the area to determine whether the center is reaching those groups within the target area it wants to serve.

There are 12 individual registration tables in the basic system. The first one provides an age, sex, and race breakdown of all the center's registrants up to the end of the reporting period. Individuals registered prior to that time are enumerated separately from those registered during the period, and the total number of different families represented by the tabulated individuals is given at the end of the table.

Data about the center's registered individuals provide information on whom the center is reaching. They can be used to compare with other target population data to determine who is being missed, and to match against center priorities to determine if they are being met. The age, sex, race distribution of registrants has two other important uses:

- Provision for predicting the overall types of morbidity and social pathology

- Used to develop expected utilization rates

The purpose of the ten health services tables is to provide information on the key elements of patient care: who provides what types of care to whom and how frequently. Such utilization of services and staff workload data are essential for proper management monitoring and control of services provided and are necessary for center planning and evaluation. These health services tables deal with the type of encounter, selected medical and dental services provided, referrals requested, and home encounters.

The basic neighborhood health center data system and its uses can be summarized as follows:

- Assist in the control of patient and record flow and the maintenance of accurate records

- Support outreach activities and assist in evaluating effectiveness

- Provide operational data on utilization of services, patient characteristics, workload levels, and payment sources
- Generate statistical tables
- Create and maintain a central data base
- Provide information for billing
- Provide data for review and improvement of operational procedures and the control of operations
- Assist in the implementation of program goals
- Provide information for evaluation and revision of program goals and priorities
- Provide operationally useful data collection forms, information lists, and statistical summaries
- Support clinical operations and monitor key elements of patient care
- Monitor services rendered, staff workloads, referrals, and appointments
- Identify operational problems, inadequate service areas, and unmet patient needs
- Supply information needed for staff organization and planning
- Provide data for research, special studies, analyses of trends, reports, and evaluation
- Provide utilization data which can be related to cost data.

## B. AUTOMATED MEDICAL RECORD SYSTEM OF THE LABORATORY OF COMPUTER SCIENCES, MASSACHUSETTS GENERAL HOSPITAL AND THE HARVARD COMMUNITY HEALTH PLAN (103)

The Automated Medical Record System (AMRS) has been operational at the Harvard Community Health Plan (HCHP) in Boston since October 1, 1969. This system has processed data for the prepaid group practice for all of the 80,000 visits of the 20,000 prepaid members and 1,000 fee-for-service patients. The medical record consists primarily of computer-generated reports which are stored in a traditional medical record folder. Data for these reports are obtained from what is called an "encounter form" which is filled out by the health provider at the time of each visit. Information is provided in four basic areas:

- Diagnostic impression, which may be specific diagnoses, non-specific impressions, or psycho-social concerns of the patient
- Diagnostic tests (included on a separate sheet which accompanies enounter form)
- Therapy
- Disposition

All nine medical specialties as well as nursing, social service, and triage have individual encounter forms, but they all share the same common format. The diagnostic impressions, tests, and therapies, were selected from the most common ones appearing in the review of past data. The provider checks off the appropriate items on the form and is allowed space to add any unlisted items which are necessary for proper recording of the care rendered. Each provider also has the option of dictating additional information about the visit, which is transcribed and pasted in the record.

The medical record contains two types of computer-generated reports: (1) an encounter report, and (2) a status report. The encounter report contains information from a single visit to a single provider and is the equivalent of a progress note. The content and format still remain the same regardless of specialty (diagnoses, tests, therapy, and disposition). Typed dictation is also affixed to the bottom of this report. Although a new page for each encounter is stored in the medical record, yearly summaries of patient encounters will be used to replace these individual ones.

A new status report is also generated each time information is put into the system. This report contains all of the information which is necessary for quick reference to the patient's condition. It is essentially an updated summary of the patient's medical status, including all facts of diagnoses and problems, latest test results, and current medications.

These encounter reports are clipped into the medical record on the left side in chronological order (recent on top); each new status report replaces the previous one and is clipped to the right side of the folder. This allows the provider in reviewing the record, a chronological summary of the patient's progress on the left and a single status report on the right which summarizes important data from all visits. As a recent addition, the Harvard Community Health Plan is now experimenting with the use of CRT's which are located in specific delivery areas for quick retrieval and display of status reports.

If a patient is hospitalized, a copy of the status report and other pertinent records are forwarded to the hospital prior to admission to facilitate the workup period. While the patient is hospitalized, the traditional hospital medical record is kept until discharge. A structured summary of the hospitalization is then prepared for data entry into the AMRS.

Forms completed by the providers are returned to the medical record room and are entered into the computer by a clerk. The computer checks coding and vocabulary at the time of input. New encounter and status reports are generated during the night and are subsequently filed into the medical record folder. Before the record is returned to the general file, the provider verifies and signs the new encounter report. Lab data are entered through a terminal located in the laboratory with the computer integrating the test result data with the encounter form data. Registration data are entered by computer input form which is separate from the medical data.

A medium-sized computer system which is located at the Laboratory of Computer Science at the Massachusetts General Hospital is used to process the records. Off-site terminals in the record room of the Harvard Community Health Plan are connected to the computer by leased telephone wires.

Generation of statistical reports requires no further data collection or input. These tables are designed to serve the needs of multiple groups: medical director, individual providers, health center administrators, Plan administrators, and evaluators. The tables currently produced fall into four classes:

- *Medical aggregates* – lists of diagnoses, test ordered, and medications prescribed, in order of their frequency, are produced for each staff member, each specialty, and for the entire plan.

- *Utilization* – aggregate tables are broken down by care provider, specialty visited, and by frequency of visits. They are cross tabulated with demographic data such as age, sex, date of registration, and duration of membership.

- *Membership data* – alphabetic lists of membership groups and aggregate tables of the characteristics of the membership population can be produced.

- *Special studies* – information can be selected from computer files regarding any group of patients whose records meet defined criteria.

The most fundamental change which accompanies computerization of the medical record is the standardization of the content and structure. This change in itself accounts for many of the advantages and drawbacks of an automated system. The principal benefit of standardization is the ability to summarize data. This has been demonstrated in HCHP in the status report which summarizes information for many encounters to provide the physician with a concise, updated summary of the patient's current problems. It is obvious that this offers a distinct advantage over the classical paper system where such a summary can only be obtained by a page by page search (if legible) since the information is available in chronological fashion. Another advantage of standardization is the ability to compare data in patient records. As a tool for patient management and preventive care, this system can identify plan members who meet certain medical criteria. This allows physicians the capability of planning and initiating action for patients who appear to need attention, rather than waiting for them to present themselves.

Comparability allows feedback in the form of individual and aggregate tables of the frequency of diagnoses made, tests ordered, and medications prescribed. These tables can be used by professional staff for peer review, appropriateness of care, and evaluation of costs.

Restrictions can be placed on standardization of data in terms of the process of data gathering of the content of the record itself. Use of pre-structured forms and vocabulary might have an influence on the physician to choose one of the listed items when an unlisted term could be more precise. Efforts have been made at HCHP to minimize the problem by revising encounter forms periodically to reflect these patterns and physician habits, and by allowing the physician to write in any terms which do not appear on the pre-coded form, and by allowing dictation of additional comment in free text form. In addition, the medical content of the present computer record is somewhat limited in the sense that it included only four areas of data on each encounter (diagnoses, tests, therapy, and disposition). Whether this format of information is adequate for the delivery of care depends on one's perception of the data requirements. This, in turn, can be affected by prior experiences and the policies of one's own work environment.

The AMRS medical administrators who are under increasing pressure to make more rational and prospective fiscal decisions must have the tools to recognize trends in health care delivery which have a direct effect on decision-making and developing budgets. With this system information is available to administrators on the aggregate medical data as well as demographic data. In this system, any data item may be used as an index for a table, therefore, its statistical tables or reports can be tailored to meet the needs of the particular departments.

The AMRS performs functions which are distributed among a number of departments and traditional medical care organizations. The conventional medical record room is responsible for only the handling and filing of the medical records, which it is estimated to cost from 25¢ to $1.75 per visit, depending on the size and nature of the institution. Traditionally, the medical record monitoring for completeness and accuracy is performed, by the clerical staff, while fiscal and utilization statistics are produced by the accounting department. Cost analyses of these services are not available from traditional settings since they are not considered separate functions. The cost of computer processing of the medical data *unique* to this system are estimated at 60¢ per visit. The cost effectiveness of the system's distinct capabilities has been difficult to measure due to inabilities to measure precisely quality and quantity of care and the value of its outcome.

## C. THE NATIONAL AMBULATORY MEDICAL CARE SURVEY (109,113)

In early 1967 the National Center for Health Statistics decided to conduct a study to determine the feasibility of establishing a National Ambulatory Medical Care Data System. Such a system would be designed to provide basic national base line and trend data for planning, legislation, program evaluation and research purposes. The feasibility study which was initiated in 1967, was essentially completed during early 1972. During the five year life of the feasibility study the planning group (NCHS staff, consultants, advisory panel, and contractors) encountered numerous problems and tested and rejected many concepts, approaches, and procedures before arriving at the National Ambulatory Medical Care Survey system finally accepted for implementation. The first problem confronted was the identification of the universe to be studied. Should the unit of measurement be the ambulatory patient; the physician or his practice; or a site such as outpatient clinics, emergency rooms, rehabilitation or day care centers, or physicians' offices? Group practices and HMO's posed special problems. It was decided that the office based practice of physicians represented a major segment of ambulatory medical care and one which was more readily identifiable and measurable than other alternative units of measurement. Consequently, the universe for study was defined as all non-federal physicians listed in the AMA physician master file for the coterminous United States who were in office based practice or who were engaged in direct patient care. It was recognized that data from the universe defined in this fashion would not necessarily be additive to data from other systems to provide a total characterization of all ambulatory care.

The next issue involved was identifying and evaluating alternative sources of data to be used. Investigations by Lea, Inc. show that only six of seven physicians maintained records and that these varied considerably in their accessibility and completeness. The majority of physicians would not accept the type of disruption of their office procedures which a transcription from their records would require.

Nor were they willing to supply copies of their office records even with patient identification removed. It was also felt that direct observations of physicians' office traffic by an enumerator would have an adverse effect on the patients in the office waiting for care. Consequently, the most promising approach appeared to be a current sampling scheme where information would be recorded on a specially designed encounter form during or shortly after the physician-patient contact.

The system to be developed would have to maximize the data collected, minimize the reporting burden on the physician, and minimize the logistical problems and cost of data collection. A number of alternative forms and enumeration procedures were tested against these criteria, and three separate field tests were conducted of national samples ranging from 700-900 physicians. The results of these tests indicated that one of the proposed forms was probably too long and represented a reporting burden on the physicians; another, while apparently more popular with the physicians, was too short to provide enough basic ambulatory care data; a third form tested was of optimal length in data requirements and reporting time and was therefore accepted for the survey. Tests also indicated that a one day reporting period, while a minimum burden on the physician, would cost the NCHS too much for amount of data obtained, whereas a week period would be excessive from the physicians viewpoint. A two-day period appeared to meet the needs of both the survey and the responding physicians and therefore was adopted as the basic enumeration period for the survey.

The planning group for the NAMCS feasibility study recognized from the outset that an adequate response rate would be the major problem in developing a National Ambulatory Medical Care Data System. This conception was confirmed in the three field tests conducted during the feasibility study. Intensive consideration was given to various alternatives for increasing response including paying the physician, donating to his choice of organization or medical school, paying his office help, token gifts to the physician or his staff, feedback to the physician of statistical data on his peers in the nation and/or his own practice, and various public relations programs.

Evidence from the evaluation questionnaire used in the study field trials as well as from other surveys such as the National Hospital Discharge Survey indicate the failure to pay the respondent is not the principal deterrent to participation in some surveys; however, in those cases where it is, the amount that would have to be paid to participating as well as to potentially non-cooperating physicians would make the survey financially impossible for the National Center for Health Statistics. The evaluation questionnaires and field experience clearly indicated that the single most important factor which could guarantee a successful ambulatory care data system was a favorable attitude toward the survey by the physician universe at large and the sample physicians in particular.

After intensive development and testing of alternative concepts, methods, and procedures during the five year period of feasibility the proposed National Ambulatory Care Data System has evolved. The system will be initiated on a continuing basis at the beginning of the calendar year 1973 and will join other surveys of health statistics in the National Health Survey System. The data from the survey will be processed on a continuing basis to produce a series of annual center-type statistical reports, data for special studies, and a body of unpublished data which will be available on request. Although some additional planning and details are being developed and finalized, it is now anticipated that a national sample of physicians engaged in direct patient care will be asked to submit completed encounter forms for ambulatory patients seen during two sample days in each of the four consecutive calendar quarters.

The data for the national ambulatory care survey will come from three sources:

- encounter form
- enlistment questionnaire
- American Medical Association and American Osteopathic Association listings

The encounter form will provide episodic data on the age, sex, race, marital status, principal complaint and diagnosis of the patient; diagnostic procedures, duration of the visit; treatment; and case disposition. The encounter form is also used in pre-determining the sample ratio to be used by each survey physician. The enlistment form is designed to confirm and update certain background information, before the patient visit reporting period, about the sample physician and to obtain additional information about the volume and nature of his practice and office procedures. The latter information is critical in determining which sample encounter form will be provided the physician for reporting his patient visits. Physicians with small practices will report on all visits during the period of days and physicians with larger practices will sample visits with a sample interval directly related to the size of their practice.

Initiating the above plan during the calendar year 1973 the National Center for Health Statistics will concentrate its resources on achieving a high response rate and obtaining high quality data. This will necessitate a modest start of about 250 physicians in each panel with a total sample of some 1,000 physicians by the third quarter of 1973. If in later years the survey gains greater visibility and acceptance by the medical world and if the National Center for Health Statistics gains greater experience in this type of data collection effort, the sample size will be increased and other modifications may be introduced into the survey. In the future it may be possible to add ad hoc supplementary items to the encounter form and to conduct special studies as follow-ups to the basic survey. Longitudinal studies to measure the courses of specific diseases identified by the National Ambulatory Medical Care Survey may also be possible. The data may also be used to compare local ambulatory practices with those of the nation as a whole. The continuing nature of the survey should permit observation and measurement of trends and methods of treatment and the course of selected epidemiological conditions. It should also provide valuable information for measuring the speed and effectiveness with which advances in medical practice, technology, and pharmacology become introduced into a basic segment of medical care; the physician's practice. The survey results will be used to suggest further studies and provide base line data.

## D. BASIC AMBULATORY DATA SET (275)

During April, 1972, an intensive five day working conference was held in Chicago on ambulatory medical care records and was sponsored by the National Center for Health Statistics, the National Center for Health Services Research and Development, and the Johns Hopkins University. Leading representatives of the major parties concerned with the collection and use of ambulatory medical care data were present at the conference. Participants included members of the American Medical Association, the American Hospital Association, the National Medical Association, medical specialty groups, representatives of the Health Services and Mental Health Administration, representatives of the Social Security Administration, directors of regional, state and local health information systems, experts in epidemiological and health services research, and individuals with experience in ambulatory care records from Canada and the United Kingdom. This conference, which was similar to the previously described conference held at Airlie House in June, 1969, examined the component of ambulatory medical care records with the purpose of identifying the basic requirements for information about this equally important component of medical care and to propose measures for meeting these requirements.

The conference participants were fully cognizant about the requirements and opportunity for improving basic information about ambulatory care. With the increasing emphasis on ambulatory services as a more suitable and less expensive modality of care for many health problems, the conference participants postulated that better data are essential for at least eight functions:

- To assist physicians in caring for patients and managing practice

- To facilitate self evaluation by peer review

- To provide the medical profession with a better understanding of the natural history of health problems, complaints and diseases

- To assist those responsible for the management of group practice and ambulatory health systems, in planning services and in allocating personnel and other resources, and in monitoring costs.

- To assist medical educators in clarifying the objectives of curricula for medical personnel and health services administrators

- To support the efforts of local, state, and national agencies in formulating objectives, plans, and policies for improving health services

- To serve needs of private and public insurance carriers, Blue Cross and Blue Shield, Social Security Administration, and related federal payment programs and to permit the development of uniform health insurance claims forms and patient billing forms

- To provide epidemiologists and other health research investigators with sampling frames for research designed to improve the impact of health services

The conference set forth that the first and most important steps are to identify the basic core of data germane to these functions and to introduce uniform terms, definitions, and classifications for this data set. The major concern of the conference was the proliferation of different ambulatory medical record information systems being introduced by federally sponsored health programs, by medical foundations and institutions, and by commercial data processing companies. The conference participants proposed that a minimum uniform basic data set form a part of each patient's medical record to facilitate universal availability for abstracting, reporting, and analysis.

The participants proposed the following list as a minimum basic data set to be incorporated in the medical record:

- Registration data

    – patient identification
    – residence (including zip code)
    – date of birth

  - sex
  - marital status
  - race

- Encounter data

  - facility identification
  - provider identification
  - patient identification
  - source(s) of payment
  - date
  - patient's purpose, reason, symptom or complaint
  - physician's diagnosis of problem designation
  - diagnostic, therapeutic or management procedures
  - disposition of patient

It was emphasized that the above mentioned list is not a substitute for a reporting system or a more extensive clinical record. It was described as the irreducible minimum of data required for the eight listed functions and the data set most in need of common definition at this time. It was recognized that this basic data set would be necessary but rarely sufficient for most purposes.

The conference participants felt that each term needs to be defined specifically, and methods of classifying and coding the information agreed upon. Where suitable, the terms, definitions, and classifications should be identical, or at least compatible, with those that comprise the recently developed Uniform Hospital Discharge Data Set. They should be related to domestic and international terminology and classification, such as the ICDA-8, Current Medical Terminology, the glossary published by the American Record Association, and the various classifications for procedures. Classifications should also be developed for:

- Types of provider settings, facilities and organizations

- Types of health care providers and personnel

- Reasons or purposes for using ambulatory medical care

- Symptoms, complaints, conditions or health problems

- Procedures and services

Wherever feasible, pre-coded classifications and reporting methods should be encouraged. Problems of reliability, validity, and utility of terms, classifications and data elements should be examined initially and subjected to continuing methodologic and evaluative research. Particular attention should be paid to the problems of making usable information promptly available to physicians and administrators in a basic data set in order that they may assess its value in the care of patients and in the management of practices, health care organizations and institutions.

## VI. SUMMARY OF CONFERENCE PROCEEDINGS ON HOSPITAL AND AMBULATORY CARE DATA

### A. HOSPITAL DISCHARGE ABSTRACT SYSTEMS (180)

The Airlie House Conference on Hospital Discharge Abstract Systems put forth a series of major recommendations. The Conference agreed that hospital discharge abstract systems were essential for at least six functions. They were:

(1) To provide data for periodic review of patient management patterns

(2) To provide data for efficient and economical hospital management

(3) To relate charges for hospitalization to diagnostic and individual patient information

(4) To provide data for community and regional health planning bodies

(5) To provide data for health services and epidemiological research

(6) To provide common insurance claims forms for use by private insurance carriers, Blue Cross, and the Social Security Administration

The participants of the Conference who represented the major users and operators of hospital discharge abstract data believed that a minimum basic data set for inclusion in hospital discharge abstract systems could be identified and that the routine collection of this data set in a uniform manner was feasible. The major concerns motivating the participants to seek the uniform basic data set were the rising costs of care, persistent maldistribution of services, increasing impact of the hospital on both health services and health status of the total community, and the changing role of the hospital and community health service. The major recommendations of the conference were:

### Recommendation A

The Conference recommended that the inclusion of the following elements in a minimum basic data set and that all short-term general hospitals should collect these on all discharges.

- Patient identification
- Date of birth
- Sex
- Social characteristics
- Resident's identification for conversion to census tract
- Hospital identification
- Physician identification
- Source of referral
- Admission and discharge dates
- Service to which patient is admitted
- Diagnoses
- Surgical procedures
- Disposition (if death, was autopsy performed)
- Payment sources
- Charges

Each term would be defined specifically, and methods of classifying and coding the information agreed upon. The terms need to be related to such classification schemes as the ICDA-8, Current Medical Terminology, and the glossary published by the American Association of Medical Records Librarians. The problems concerning the reliability and validity of the data would also need serious consideration.

The Conference also believed that all existing systems, with relatively minor modifications, have the capability to produce this minimum uniform basic data set. Existing national and regional systems would need to be encouraged to request these data from all participating hospitals. It was stipulated that this recommendation should not be interpreted as limiting the amount of supplemental information collected and processed the data systems or individual hospitals.

The recommendation to include place of residence information would permit referral of all information collected to population denominators based on census tract aggregations.

In an effort to implement these recommendations, the conference proposed that a continuing group, with representatives from all interested parties, be set up to deal with the technical problems and terms, definitions, classifications, codes, maintenance of reliability, and requirements for legitimization. The participants felt that the Department of Health, Education, and Welfare would be the most appropriate and effective agency to sponsor such a group and recommended that a subcommittee of the National Committee on Vital and Health Statistics be set up for this purpose. This subcommittee and the contracts awarded to the Health Research and Education Trust and Health Services Foundation were previously discussed.

### Recommendation B

The Conference recommended the support of research and development in the following areas where major unresolved conceptual technical problems still remained:

(1) Confidentiality of information on patients, physicians and hospitals. Participants considered this issue to be of major importance and in need of further exploration.

(2) The generation of information on the use of services in hospital outpatient departments, physicians offices, extended care facilities, and special hospitals.

(3) The development of social indicators and indicators of functional status of patients, which would be included on the basic data set, once perfected.

(4) A systems approach to providing information to multiple users by means of single instruments (e.g., summary of face sheets, names, forms

and discharge abstracts) thereby reducing paper work. This technique also generates the basic data for machine preparation of diagnostic and patient indexes.

(5) Linkage of records of health related events, was considered highly desirable. In anticipation of record linkage, positive patient identification would need to be ultimately included in the patient data set. The Conference recommended that techniques for record linkage receive research and development support.

(6) The Conference stressed more effective coordination between the National Hospital Discharge Survey and existing systems. The National Center for Health Statistics indicated that it was prepared to experiment with the collection and processing of data obtained from hospital discharge systems when hospitals falling with the HDS sample are participating in the systems.

(7) The Conference recommended that the National Center for Health Services Research and Development participate actively in the solutions of these problems. This would allow the establishment of experimental regional health data clearinghouses where these problems could be studied.

### Recommendation C

The Conference strongly recommended that the recommendation and background papers of the sessions be published and widely disseminated. This has been accomplished (180).

## B. BASIC AMBULATORY DATA SET (275)

The participants in the Conference on minimum basic data set for ambulatory care also produced three sets of recommendations which parallel those set forth at the Airlie House Conference on Hospital Discharge Data. The three sets of recommendations were as follows.

### Recommendation A

A continuing group, with wide representation from interested parties, should be established promptly to determine the content, terms, definitions, classifications schemes and codes to be employed in the Basic Ambulatory Data Set. This group should review the basic data set periodically and revise it on the basis of experience. The participants believed that the Department of Health, Education &

Welfare was the most appropriate and effective agency to sponsor such a group, and recommended that a sub-committee and one or more task forces of the National Committee on Vital and Health Statistics be designated as responsible for these purposes.

Research and development in areas where major unresolved conceptual or technical problems remain should be undertaken. Among these are:

(1) Positive patient identification within and between health care sources, systems and regions is of major importance and needs further exploration. The patient identification number was considered to be the key to linking events in the medical management of the individual patient, to incorporation of ambulatory data with inpatient data and the patient profile, and to an understanding of individual and community patterns of medical care.

(2) The uses of information generated from records incorporating the minimum basic data set needs critical examination. Methods for aggregating, tabulating, analyzing and displaying information should be subjected to periodic revision in order that they can be usefully applied to all points of the health care system.

(3) Testing of the minimum basic data set should be undertaken in several kinds of settings such as direct federal health services programs; federally funded health services organizations; cooperative federal, state, local health services data systems; medical societies and foundations; and circumscribed geographic regions where all or most of the physicians agree to participate; prepaid group practices; hospital-based ambulatory services; university-sponsored health care organizations; and practices of members belonging to medical associations or specialty groups.

(4) Operations research and demonstration projects are needed to experiment with methods and organizational frameworks for capturing, tabulating, aggregating and assimilating information on ambulatory medical care at the local, state, and regional levels.

(5) Incorporation of the minimum basic data set into record-keeping reporting, monitoring and payment systems should be undertaken as part of the contingency planning for the prospect of some form of national health insurance or other form of generalized third-party payment scheme.

(6) Skilled manpower should be trained to conceptualize, design, and operate statistical and information systems at federal, state, local, organizational institutional levels.

(7) Development of measures including indexes and profiles of the functional status of patients should be encouraged. Measures of urgency, severity, rate of progression, duration of illness, and of expected outcome require creation, testing, and evaluation for application to individual patients and populations.

(8) Forms and arrangements for data collection should be developed, tested and evaluated, so that minimal writing will be required of the physician and maximum use will be made of the data.

### Recommendation B

The Conference recommended that as soon as the precise content, terms, standards, uses and feasibility of the minimum uniform basic data set have been established, it be widely promoted and adopted by all parties concerned with the ambulatory medical care.

The minimum uniform basic data set should be required as part of the basic medical record, and abstracted as appropriate by:

- Federally funded health services and health insurance programs
- Cooperative federal – state – local health services data systems
- Private insurance carriers; Blue Cross and Blue Shield; accrediting, certification and licensing groups and agencies; professional review organizations

The National Ambulatory Medical Care Survey (previously described) and all related federal, state, and local surveys should incorporate the minimum basic data set, with the exception of patient identification in their collection procedures.

### Recommendation C

The Conference recommended that the appropriate background papers and discussions of the conference be published promptly and distributed widely. The proceedings of this Conference will be published shortly (275).

# PART III

## APPENDIX A

## RESTATEMENT OF THE BENNETT AMENDMENT (P.L. 92-603)

# APPENDIX A
# RESTATEMENT OF THE BENNETT AMENDMENT (P.L.92-603)

The purpose of P.L.92-603 is to promote the effective, efficient, and economical delivery of Medicare and Medicaid health services through the application of professional standards review procedures. The provision is designed to assure proper utilization of care and services through a formal professional mechanism representing the broadest possible cross-section of practicing physicians in an area. The review would assure, within recognized professional health care standards, that medical services financed under the Social Security Act are:

- Of appropriate quality,
- Provided only when necessary, and
- Provided in the most economical fashion.

## Professional Standards Review Organizations

The Secretary will establish appropriate areas throughout the country by January 1, 1974, and at the earliest practicable date, designate a qualified organization as the PSRO for each area.

A qualified organization will be a nonprofit professional association, with voluntary membership, including a substantial number of the practicing physicians in the area (generally stated at 300 or more). Membership in the PSRO and service for the PSRO cannot be constrained by a requirement for membership in or payment of dues to a medical society. The qualified organization must demonstrate its professional competence to review health care services in a formal plan submitted to the Secretary.

Until January 1, 1976, the Secretary will be able to make such agreements only with a qualified organization which represents a substantial proportion of the physicians in the geographical area designated. Until January 1, 1976, at the request of 10 percent or more of the practicing physicians in a geographical area designated by the Secretary, the Secretary will be required to poll the practicing physicians in the area as to whether or not an organization of physicians which has requested to conclude an agreement with the Secretary to establish a PSRO substantially represents the practicing physicians in that area. If more than 50 percent of the practicing physicians in the area responding to the poll indicate that the organization does not substantially represent the practicing physicians in the area, the Secretary will not enter into an agreement with that organization.

After January 1, 1976, in any area where such a professional organization is unwilling or unable to meet these conditions, the Secretary may designate any public, nonprofit private, or other agency or organization as the PSRO providing that:

- The final determinations of peer review are made by physicians, and
- That the agreement will not be renewed if a qualified professional organization is willing and able to become the PSRO for the area.

Each PSRO will review the utilization and quality of all institutionally provided services in the designated area. The PSRO will not be involved with the determination of reasonable charges. With the concurrence of the Secretary, the PSRO may also review other than institutional services. These reviews will determine that:

- The services and items are or were medically necessary,
- The quality of the services meet professionally recognized standards of health care, and
- The services are or were provided at the most economical level of care appropriate to the need (i.e., outpatient, extended care, hospital, etc.).

To accomplish these purposes, the PSRO will utilize and apply regional norms of care and treatment, based upon typical patterns of practice in the region, prepared and revised by the National Council. Norms will be developed in accordance with the regulations of the Secretary and will include:

- The type and extent of service within the range of appropriate treatment for each illness or health condition, and
- The type of health care facility which can most economically provide appropriate medical services for each illness or health condition.

Each PSRO will utilize the norms described above as the standards for evaluation and will perform the following functions:

(1) Prospective determination of the medical necessity and appropriateness for elective admissions and extended or costly courses of treatment.

(2) Periodic determination and publication of selected types and kinds of cases (by service, diagnosis, or other criteria) for intensive and more effective review.

(3) Regular review of profiles of care for selected patient groups, practitioners, and other providers of service.

(4) Time specification for the certification of continuing inpatient care not later than the regional norm for the 50th percentile of length of stay for patients in similar age groups with similar diagnoses.

(5) Require physician certification, and supporting justification for continued inpatient care beyond these specified points in time.

(6) Foster the acceptance of PSRO functions by broad physician participation, rotating membership on review committees, wide specialty representation, and publication of PSRO activities in appropriate professional publication.

(7) Report any violations of the obligations of a practitioner, hospital, or other health care facility, agency, or organization, under this Program, to the State Council including any pertinent recommendations.

(8) Notify any practitioner or provider, and provide opportunity for discussion and review, when any determination denies a request for services or identifies a violation of any obligation by the practitioners or provider.

(9) Notify the pertinent intermediary of any disapproved services or items.

Physicians assigned the responsibility for hospital review should have hospital privileges in at least one of the participating hospitals in the area and should not be responsible for, but may participate in, the review of services in their own hospital. No physician will review services in which he was directly or indirectly involved or services provided by any institution, organization, or agency in which he or his family have a vested interest.

After notification, any beneficiary or recipient who is dissatisfied with a decision made with regard to his claim, will be entitled to a reconsideration by the PSRO. This decision may be appealed to the State Council, if the determination involves more than $100. Where the decision of the State Council is adverse, or in the absence of a State Council, a beneficiary will be entitled to a hearing by the Secretary in any controversy involving more than $100 and to judicial review of the Secretary's decision if the controversy involves more than $1,000.

After notification of an adverse decision by the PSRO, a practitioner or provider will have an opportunity for further discussion and review by the PSRO. The final recommendations of the PSRO are referred to the State Council and then to the Secretary who may apply authorized sanctions. Any provider who is dissatisfied with an adverse decision made by the Secretary, involving exclusion from the Program or requiring repayment, is entitled to a hearing by the Secretary and to judicial review of the Secretary's final decision.

### State Councils

In any State with three or more PSRO's, the Secretary will establish and appoint the membership of a State Council which will include:

- One representative designated by each PSRO.
- Four physicians (two designated by the State medical society and two designated by the State hospital association).
- Four knowledgeable public representatives (two recommended by the Governor of the State).

Each State Council, and the PSRO's in states without a Council, will have an Advisory Group of seven to eleven members including representatives of health care practitioners, other than physicians, and hospitals and other facilities which provide Medicare and Medicaid services in the State. The Secretary will provide regulations to determine the manner in which the Advisory Group is selected.

The State Councils, where established, will:

- Review, comment upon, and transmit to the Secretary any reports, received from the PSRO's concerning violations of the Program.
- Review any appeals to a PSRO decision involving more than $100.
- Coordinate the activities of, and disseminate information and data among, the various PSRO's in the State.
- Assist the Secretary in developing uniform data gathering procedures to insure efficiency and objective comparison.
- Assist the Secretary in the evaluation of each PSRO.
- Assist the Secretary in developing and arranging for a qualified PSRO replacement, when necessary.

## National Council

A National Professional Standards Review Council of eleven physicians will be appointed by the Secretary for three year terms with eligibility for reappointment. The Secretary will designate one of the members to serve as Chairman. A majority of the Council will be recommended by national organizations representing physicians, but the Council will include physicians recommended by consumer groups and other health care interests. All members will be physicians of recognized standing and distinction in the appraisal of medical practice.

The National Professional Standards Review Council will:

- Advise and assist the Secretary in the administration of the program.
- Prepare and distribute regional "norms," with periodic revisions, based on a review of appropriate and adequate data.
- Provide technical assistance in the utilization of such norms of care and treatment.
- Review the comparative performance and effectiveness of State Council's and PSRO's.
- Recommend measures to improve the Program.
- Submit an annual report to the Secretary and to the Congress.

## Authorizations to Strengthen the PSRO

To the extent necessary or appropriate for the proper performance of its duties and functions, the PSRO serving any area is authorized, in accordance with regulations prescribed by the Secretary, to:

(1) Make arrangements to utilize the services of practitioners or specialists to conduct the necessary review.

(2) Undertake professional inquiry before or after, or both before and after, the provision of any service.

(3) Examine the pertinent records of any practitioner or provider.

(4) Inspect the physical facilities in which care is rendered.

(5) Utilize the services, and accept the findings of area hospital review committees with demonstrated competence.

(6) Utilize the services of medical societies and similar organizations to assist in one or more of the review activities, when they have demonstrated their capacity to effectively perform these functions in a timely fashion.

After proper notification, no Medicare or Medicaid claim will be paid if the service or item in question is subject to review by a PSRO, and has been disapproved by the PSRO.

The legislation specifically obligates each health care practitioner and provider, to the extent of their influence or control, to provide services:

- Only when and to the extent that they are medically necessary,
- Of a quality which meets professionally recognized standards of health care, and
- At the most economic level of service.

Failure to comply with these obligations, in a substantial number of cases, or one or more gross and flagrant violations of these obligations may lead to:

- Exclusion from eligibility for reimbursement under Medicare and Medicaid on a permanent basis or for a stated period of time, or
- A requirement for repayment of the improper service or $5,000 whichever is less.

Both sanctions would be applied only after proper application of the appeals mechanism, described earlier, and exclusion from eligibility for payment would become effective only after notification to the public.

The provisions of this Amendment apply to the operation of any State plan approved under the Social Security Act as a Medicare or Medicaid health care program.

All data and information acquired by a PSRO is confidential and will only be disclosed on a need-to-know basis or as provided by the Secretary in regulations. Illegal disclosure may result in a fine of not more than $1,000 and imprisonment of not more than six months, or both.

Limitations on liability are provided by the legislation for activities in relation to a PSRO. Notwithstanding any other provision of law:

- No person will be liable for the provision of relevant information which he believes to be true, to a PSRO.
- In the absence of malice, no person is liable for the performance of his duties as an employee or agent of a PSRO.
- No practitioner or provider is liable for actions in his normal work, taken with due care, in compliance with the accepted norms of care and treatment applied by a PSRO in his area.

### Implementation of the Program

The Secretary will establish appropriate areas for PSRO's, throughout the United States, not later than January 1, 1974 and designate qualified organizations as PSRO's at the earliest practicable date thereafter.

Pending assumption of responsibility, and demonstration of capacity for improved audit, current activities will be continued.

The Secretary will review and approve a formal plan for progressive assumption of full responsibility and initially designate an organization as a PSRO on a conditional basis. During the trial period (not to exceed 24 months) the Secretary may require the PSRO to perform only limited duties and functions. Assumption of responsibility for duties should proceed in accordance with the approved plan, so that at the end of the trial period, the PSRO is performing all required duties and functions.

Conditional PSRO agreements may be terminated by either party on 90 days' notice.

Any duties and functions not performed by a PSRO, during a trial period, will continue to be performed as presently authorized. The Secretary is authorized to waive any other review requirements when substantial evidence indicates that the PSRO meets or exceeds those requirements.

The Secretary will provide regulations for correlation and cooperation between carriers, intermediaries, government agencies and PSRO's which include the usage of existing data gathering capacity where appropriate.

The Secretary is authorized to provide all necessary technical assistance to appropriate organizations in developing a plan for designation as PSRO's.

Expenses incurred in the administration of this Amendment are payable from the Hospital Insurance Trust Fund, the Supplementary Medical Trust Fund, and funds appropriated for other titles of the Social Security Act in such proportion as the Secretary deems to be equitable. These expenses may include:

- Technical, consultative, secretarial and clerical services, and compensation for the National Council.
- Reasonable and necessary expenses for the State Councils, including the cost of the Advisory Groups.
- Reasonable and necessary expenses for the operation of the PSRO's.
- The expenses of technical support services to help develop PSRO's.

## APPENDIX B

## GLOSSARY OF SELECTED TERMS

We have included this glossary of selected terms because of evident confusion concerning their use in medical care appraisal. The most common meaning for each term has been given. While this usage may not agree with all other reports, it will at least provide a common language for the intepretation and discussion of this paper.

*Structural Appraisal* – evaluation of the preparation of an individual professional or the adequacy of a facility or organization to provide specific health services at a stated level of quality. Structural appraisal often includes licensure and/or certification.

*Process Appraisal* – evaluation of health services actually provided to patients or the operation of institutional mechanisms designed to effect health services.

*Outcome Appraisal* – evaluation of the results or consequences of disease or medical intervention. Outcomes may be either intermediate or final. Outcomes with regard to individual patients or population groups may be subclassified as:

> *Patient Outcomes* such as mortality or survival, physical or psychological morbidity, and the level of function;
>
> *Process Outcomes* including patient satisfaction, understanding of disease, compliance with medical regimens, and altered level of risk;
>
> *Administrative Outcomes* including the utilization of services, work loads, waiting time intervals, and other volumetric measures of managerial interest;
>
> *Economic Outcomes* specifying the costs generated by services provided.

*Criteria* – specified elements of medical care considered appropriate or relevant to each diagnosis or condition.

*Norms* – empiric measures of performance such as length of stay by diagnosis.

*Standards* – the desired level of compliance with criteria or norms. Standards sometimes refer to criteria which have been validated by outcomes evaluation.

*Normative Criteria* – criteria determined by the consensus of selected committees.

*Critical Criteria* – those anticipated to best discriminate among physicians or thought most important to good care.

*Clerical Guidelines* – minimal criteria to enable non-professional review and indicate cases in which professional review is required.

*Regional* – refers to any designated geographic area rather than the specific geography of the Federal health regions.

*Population Based Data* – refers to health measures or the utilization of services per unit of population defined by geographic or demographic characteristics.

# APPENDIX C
# BIBLIOGRAPHY

This unannotated bibliography on the state of the art of medical care appraisal was developed from existing materials by careful collation of a series of both annotated and unannotated bibliographies and from key references cited. References actually studied by our staff are starred. Key references, in the opinion of our staff, are underlined.

The source materials used to develop the bibliography included, but were not limited to:

- Health Services Research Bibliography, John W. Williamson, M.D., 1969.
- Evaluating the Quality of Health Care, Selected Bibliography, HSMHA Library, No. 72-2, May 15, 1972.
- Health Services Research Bibliography, 1972-73, John W. Williamson and James B. Tenney.
- Selected Bibliography of Social, Cultural, Economic, and Behavioral Factors Relevant to Health and Health Care Delivery prepared by the Regional Medical Program Service.
- Utilization Review, A Selected Bibliography 1933-1969, Donald C. Reidel, Ph.D.
- The Impact of Medicare, An Annotated Bibliography of Selected Sources, Mary McGee, Social Security Administration, 1969.
- Planning for Hospital Discharges, A Bibliography with Abstracts and Research Review, 1970, Center for Community Health and Medical Care, Harvard University.
- Methodology in Evaluating the Quality of Medical Care, An Annotated Selected Bibliography, 1955-1968, Altman, Anderson and Barker.

- A Guide to Medical Care Administration, Volume II: Medical Care Appraisal, Avedis Donabedian, M.D.
- Report of the Conference on Hospital Discharge Abstracts Systems, Medical Care, 8: No. 4, Supplement, 1970.
- Utilization Review Bibliography, Utilization Review Training Institute conducted by Hospital Utilization Project of Western Pennsylvania.
- Evaluating Outcomes of Health Services, An Annotated Bibliography, Bonnie Winters Klein, 1970.
- An Inventory of Medical Care Appraisal Activities, George Goldberg, M.D., Community Health Services, 1972.

We would also like to acknowledge the assistance given to us by Mr. August La Rocca and the opportunity to use the library at the Center for Community Health and Medical Care, Harvard University.

While the terms used, and the number of subclassifications included, may vary, there is common agreement among most authorities that the spectrum of medical care appraisal includes:

- The organizational *structure* and the professional capacity to provide care;
- The *process* by which care is actually provided; and
- The *outcomes* or results of the care provided.

Our bibliography has been organized to conform to this common perception.

State-of-the-art papers were prepared, and included in this volume, covering those aspects of medical care appraisal most pertinent to peer review. These papers were developed by study of the references starred in the bibliography.

Since the literature in this field has already been excellently described by the monographs and annotated bibliographies described above, we made no effort to comprehensively review the entire literature; rather we attempted to abstract from the literature and analyze those available techniques which are pertinent to peer review in PSRO's, EMCRO's, or other organized agents designed to improve and protect the quality of medical care.

## STRUCTURAL APPRAISAL

1. Abbe, L.M., and Baney, A.M., The Nation's Health Facilities; Ten Years of the Hill-Burton Hospital and Medical Facilities Program 1946-1956, Washington, D.C., U.S. Department of Health, Education and Welfare, PHS Pub. No. 616, 1958.

2. American Academy of Pediatrics, Committee on Fetus and Newborn, Standards and Recommendations for Hospital Care of Newborn infants, Full-Term and Premature, Revised, Evanston, 1957, 144 pp.

3. American Academy of Pediatrics, Committee on Hospital Care. Care of Children in Hospitals. Evanston, 1960. 96 pp.

4. American College of Obstetricians and Gynecologists. Manual of Standards of Obstetric-Gynecologic Practice. Chicago: The College, 1965, 120 pp.

5. American College of Surgeons, Committee on Trauma, A Model of a Hospital Emergency Department, Chicago, 1961, 16 pp.

6. American College of Surgeons, Manual of Hospital Standardization, Chicago, 1946, 6 pp.

7. American Hospital Association. Physical Therapy Service: A Guide to Organization and Management. Chicago, 1965. 48 pp.

8. American Hospital Association, "Statement on Planning Construction in Small Communities", Hospitals, Journal of the American Hospital Association 42:119, January 16, 1968.

9. American Hospital Association, and the Public Health Service, Area-wide planning for Hospitals and Related Health Facilities, Washington, D.C., U.S. Dept. of Health, Education and Welfare, PHS Pub. No. 855, July, 1961.

10. American Nurses' Association, Committee on Nursing Service, Standards for Organized Nursing Services, American Journal of Nursing 65:76-9, March 1965.

11. American Nurses' Association, Public Health Nurses Section. Function, Standards and Qualifications for Public Health Nurses. New York, 1955. 16 pp.

12. American Nurses Association. Statement of Standards for Nursing Care in Nursing Homes. New York, 1960. 3 pp.

13. American Psychiatric Association, Committee on Standards and Policies of Hospitals and Clinics. Standards for Hospitals and Clinics. Washington, 1956. 47 pp.

14. American Standards Association, American Standard Specifications for Making Buildings and Facilities Accessible to, and Usable by, the Physically Handicapped, New York, 1961, 11 pp.

15. Anderson, Odin W., Administration of Medical Care: Problems and Issues, Ann Arbor Michigan, The University of Michigan Press, School of Public Health, 1947.

16. Anderson, Odin W., "Health Services Systems in the United States and Other Countries: Critical Comparisons", New England Journal of Medicine: 319, October 17 and 24, 1963.

17. Appel, James Z., Trends in Accreditation, Hospitals 37(4):58-61 February 16, 1963.

18. Aronson, Jesse B., "Planning for Community Health Services", Public Health Reports 79:1101-1106, No. 12, December 1964.

19. Barlick, Martha M., Guide for Public Health Nurses Working with Children, U.S. Department of Health, Education and Welfare, Washington, D.C., 1961.

20. Barr, Robert N., Knudsen, Helen L., Harrison, William C., and Wolcyn, Bernard A., Program for Improving Patient Care Services: What Minnesota Found in a Three-Year Study. Hospitals 37(20):81-4, ff. October 16, 1963.

21. Bernard, S.E., "Providing Comprehensive Medical Care", Public Welfare: 286, October 1967.

22. Bierman, Pearl; Myers, Beverlee; Rodak, John; and Reibel, Jay, "Certifying Independent Laboratories Under Medicare", Public Health Reports 83:731-39, September 1968.

23. Blankenhorn, M.A., Standards of Practice of Internal Medicine and Methods of Assessing The Quality of Practice in Hospitals, Ann Intern Med 47:367-374, August 1957.

24. Blewett, Emerson K., "The Rural Medically Indigent and Adequate Hospital Care", Texas State Journal of Medicine 56:904-906, December 1960.

25. Brown, H.J., "Planning for Rational Organization of Urban Health Services: The Health Service Administration of New York City", Medical Care: 169-175, May 1967.

26. Buell, Bradley and others, Community Planning for Health Services, New York, Columbia University Press, 1952.

27. Buie, Louis A., Sr., Specialty Certifying Boards in American Medicine, British Medical Journal 1:543-7, February 27, 1965.

28. Burlage, R., New York City's Municipal Hospitals: A Policy Review (Appendix B), Washington, D.C.: Institute for Policy Studies, 1967.

29. Carlson, Rick J., "Health Manpower Licensing and Emerging Institutional Responsibility for the Quality of Care", Law and Contemporary Problems, 35:849-78, 1970.

30. Cashman, J.W., and Myers, B.A., Medicare: standards of service in a new program – licensure, certification, accreditation, American Journal of Public Health, 57:1107-17, July 1967.

31. Cashman, John W., M.D., "Qualifying for Medicare", Nursing Homes, 15:20-23, April 1966.

32. Cashman, John W., M.D., and Myers, Beverlee A., "Medicare: Standards of Service in a New Program – Licensure, Certification, Accreditation", American Journal of Public Health 57:1107-1117, July 1967.

33. Cashman, John W.; Bierman, Pearl; and Myers, Beverlee, "The 'Why' of Conditons of Participation in the Medicare Program", Public Health Reports 83:714-718, September 1968.

34. Cavanagh, J.P., "Planning for Community Health Services: The Urban Crisis and Federal-State-Local Relations", Bulletin of New York Academy of Medicine 44:159-165, February 1968.

35. Coker, Robert E., Jr., Bernard G. Greenburg, Kurt W. Back, Thomas G. Connelly, Frances S. McConnell, Norman Miller, and John Kosa, "The University of North Carolina Study of Public Health Physicians", Milbank Memorial Fund Quarterly 44(2):149-54, April 1966.

36. Cook, Robert C., "Demographic Factors in Community Health Planning", Population Bulletin 17(1):1-11, February 1961.

37. Cronin, John W., and Galbraith, Thomas P., Planning Multiple Disability Rehabilitation Facilities, Hospitals 30(6):47-54 ff., March 16, 1956.

38. Densen, Paul M., The Quality of Medical Care, Yale Journal of Biological Medicine 37:523-36, June 1965.

39. Derbyshire, Robert C., Medical Licensure and Discipline in the United States.

40. Donabedian, Avedis, Evaluating the Quality of Medical Care, Milbank Mem. Fd. Quart., 44(3):166-206 (Part 2), July 1966.

41. Editorial. The Responsibilities of the Medical Profession in the use of X-rays and Other Ionizing Radiation, Ann. Intern. Med., 46:638-42, March 1957.

42. Ellicott, V.L., A State Program for the Development of Standards for Good Medical Care for the Aging, American Journal of Public Health 52:2093-9, December 1962.

43. " 'Emergency' Medicare and Desegregation: A Special Report", Hospital Practice 3:14-19, July 1968.

44. Experience Dictated this Equipment List, Hospitals 32(6):42-4, March 16, 1958.

45. Falk, I.S., Schonfeld, H.K., Harris, B.R., Landau, S.J., and Milles, S.S., The Development of Standards for the Audit and planning of Medical Care. 1. Concepts, research design and the content of primary physician's care, American Journal of Public Health 57:1118-1136, July 1967.

46. Fendall, N.R., "Auxiliary Health Personnel: Training and Use", Public Health Reports 82:471-479, June 1967.

47. Fordham, "Medical Licensure – A Comparative View", J.A.M.A. 192: 832-836, 1965.

48. Forgotson, E.H., Professional accreditation, certification and official licensure as assurances of high quality health care, Quality in Health Care. Report of the 1968 National Health Forum, U.S. Department of Health, Education and Welfare, Public Health Service, II:15-30, 1968.

49. Forgotson, E.H., and Cook, John, "Innovations and Experiments in Uses of Health Manpower – The Effect of Licensure Laws", Law and Contemporary Problems 32:731-50, 1967.

50. Forgotson, E.H., Roemer, R., and Newman, R.W., Legal Regulation of Health Personnel in the United States, Report to the National Advisory Commission on Health Manpower II, 1968.

51. Forgotson, Edward H., and Roemer, Ruth. Government Licensure and Voluntary Standards for Health Personnel and Facilities: Their Power and Limitations in Assuring High-quality Health Care, Medical Care 6: 345-54, Sept.-Oct. 1968.

52. Forgotson et al, Licensure of Physicians, Washington University Law Quarterly, pp. 267-273, 1967.

53. Freidson, E. and B. Rhea, "Knowledge and Judgment in Professional Evaluations", Administrative Science Quarterly 10:107-124, 1965.

54. Gibson, C.D., Jr., and Kramer, B., Site of Care in Medical Practice, Medical Care 3:14-17, January-March 1965.

55. Gibson, Robert, "Medicare and the Maintenance of Treatment Standards", Mental Hospitals: 28-30, November 1965.

56. Grant, J.B. "Health Centers and Regionalization", American Journal of Public Health 43:9-13, January 1953.

57. Grynbaum, Bruce B., Quality Control in an Urban Amputee Program, American Journal of Public Health 56:1199-204, August 1966.

58. Haire, E.B., "Fitting the Individual Hospital into the Regional Plan", Hospitals 40:47, May 1, 1966.

59. Haldeman, Jack C., Elements of Progressive Patient Care, Tentative Draft, Washington, U.S. Public Health Service, 1959, 87 pp.

60. Haldeman, Jack C., and Galbraith, Thomas P., Elements of a Multiple Disability Rehabilitation Facility, Hospitals 33(17):57-61 ff., September 1, 1959; 33 (18):42-8 ff., September 16, 1959.

61. Health Insurance Plan of Greater New York, Medical Control Board, Professional Standards for Medical Groups and Standards for Medical Group Centers, New York, 1955, 23 pp.

62. Herman, Harold and Joroff, Michael, "Planning Health Services for New Towns", American Journal of Public Health: 663-640, December 1966.

63. Hicks, Florence, "Training Neighborhood Health Aides", The American Journal of Nursing 65(4):79-81, April, 1965.

64. Hubbard, "Present Position of the National Board of Medical Examiners", J.A.M.A. 192:824-827, 1965.

65. Ingraham, N.R., "Planning for Healthful Communities: The Neighborhood Health Center", American Journal of Public Health: 1987-1989, December 1966.

66. James, G., "Function of Health Facilities in the total Medical Care Complex", Public Health Reports 81:497-504, June 1966.

67. James, G., and Hilleboe, H.E., "Evaluation During the Development of a Public Health Program in Chronic Disease", American Journal of Public Health 45:140-150, 1955.

68. James, George, Improving the Quality of Medical Care During the Next Decade, Arch. Phys. Med. 45:53-61, February 1964.

69. Johnson, R.L., and others, "Satellite Hospitals", The Modern Hospital 105(4):103, 1965.

70. Joint Commission on Accreditation of Hospitals, Standards for Hospital Accreditation, Chicago.

71. Kasten, Jack, the Case for Standards in Home Care Programs, The Gerontologist 3:14-17, March 1963.

72. Keelty, Louise, et al., One Life – One Physician: An Inquiry Into the Medical Professions' Performance in Self-Regulation. A Report to the Center for Study of Responsive Law, Copyright, 1970 by the Center of Study of Responsive Law, Washington, D.C.

73. Kennedy, Robert H., Guidelines for an Effective Emergency Department, Hospitals 37:101-4 ff., June 16, 1963.

74. Klarman, H.E., "Economic Factors in Hospital Planning in Urban Areas", Public Health Reports 82:721-728, August 1967.

75. Kosa, John, Greenberg, Bernard G., and Coker, Robert E., Jr., "The Novice Physician in the Local Public Health Service", Milbank Memorial Fund Quarterly 44(2):214-228, April 1966.

76. Lepper, M.H., "Approaches to Meeting Health Needs of Large Poverty Populations", American Journal of Public Health: 1153-1157, July 1967.

77. Lepper, M.H., "Health Planning for the Urban Community: The Neighborhood Health Center", Public Welfare: 141-149, April 1967.

78. Makover, H.B., The Quality of Medical Care: Methodology of Survey of the Medical Groups Associated with the Health Insurance Plan of New York, American Journal of Public Health 41:824-32, 1951.

79. Masur, Jack, Laboratory Services in General Hospitals: 1. Flexibility and Simplicity are Signs of Good Design., Modern Hospital 85(2):90 ff., August 1955.

80. Medical Care Studies Unit, Development of a Hospital Service Index, Medical Care Studies Pub. No. 2, Berkeley: California State Department of Public Health, 1965.

81. "Medicare and Desegregation", Hospital Practice 2:14-18, January 1967.

82. Miller, S.M., "Solving the Urban Dilemma in Health Care: More Poverty, Greater Demand for Public Services, Reduced Financial Resources, and Fragmentation of Services", Bulletin of the New York Academy of Medicine 42:1150-1156, December 1966.

83. Morris, R., "Basic Factors in Planning for the Coordination of Health Services", American Journal of Public Health 53:248-459, February 1963.

84. Moss, Frank E., "Extended Care Benefits Under Medicare: Implications for Hospitals and Nursing Homes", Hospitals 41:49-52, January 16, 1967.

85. Murray, R.T., "Community Health Center: A Better Way to Bring the Patient Into Health System", Modern Hospital 110:87-89, March 1968.

86. Myers, R.S., "Areawide Planning for Hospitals Leads to Good Medical Services", The Modern Hospital 97:114, December 1961.

87. McClelland, J.E., "Regional Plan Links Hospitals on Family Basis, Pools Services and Equipment", Hospital Administration 8:11, March 1960.

88. McClure, William, "The City Without Medicare", Medical Economics; 204-6, September 19, 1966.

89. Nash, Robert, "Compliance of Hospitals and Health Agencies with Title VI of the Civil Rights Act", American Journal of Public Health 58:246-51. February 1968.

90. Nomeck, "Evolution of the National Board of Medical Examiners", J.A.M.A., 192:817-823, 1965.

91. Paley, Martin A., "Areawide Planning: Tool for Orderly Development", Hospitals, Journal of the American Hospital Association 40:79-82 June 1, 1966.

92. Penchansky, Roy, "Changes in Nursing Homes: Legislative Pressures and Institutional Barriers", Nursing Homes 14:17-33, November 1965.

93. Peterson, O.L., "Medical Care: Its Social and Organizational Aspects; Evaluation of the Quality of Medical Care", New England Journal of Medicine: 1238-1245, 1963.

94. Porterfield, John D., M.D., "Attaining Medicare and Pursuing Higher Standards", Medical Record News 37:295-98, October 1966.

95. Rappleye, "Major Changes in Medical Education During the Past Fifty Years", Journal of Medical Education 34:683-689, 1959.

96. Report of the National Advisory Commission on Health Manpower I, November 1967, U.S. Government Printing Office, Washington, 1967, 93 pp.

97. Rosenblatt, Daniel, "Barriers to Medical Care for the Urban Poor", New Perspectives on Poverty, Edited by Shostak and Gomberg, Prentice-Hall, Inc., 1965.

98. Rosenfeld, L.S., and Makover, H.B., The Rochester Regional Hospital Council, Cambridge: Published for the Commonwealth Fund by Harvard University Press, 1956.

99. Roth, F.B., "The Health Officer and Hospital Regionalization," Canadian Journal of Public Health 43:467, November 1952.

100. Ryder, B., "Regionalization of Medical Services in New England," American Journal of Public Health 40:6-2-604, May 1950.

101. Schonfeld, H.K., "The Development of Standard for the Audit and Planning of Medical Care; Pathways Among Primary Physicians and Specialists for Diagnosis and Treatment", Medical Care 6:101-114, March-April 1968.

102. Schonfeld, H.K., The Development of Standards for the Audit and Planning of Medical Care. Good Pediatric Care Program Content and Method of Estimating Needed Personnel, American Journal of Public Health 58:2097-2110, November 1968.

103. Sheffeld, R., "The Regional Hospital Plan, New York University Medical Quarterly 8:3, Spring 1952.

104. Sheps, Mindel C., Approaches to the Quality of Hospital Care, Public Health Report 70:877-86, September 1955.

105. Shindell, S., "A Survey of the Law of Medical Practice", J.A.M.A. 193:601-6, 1965.

106. Shindell, S., The Law in Medical Practice, University of Pittsburgh Press, 1966.

107. Shryock, "Problems and Procedures in Licensing: 1900-1965, Medical Licensing in America, pp. 77-104.

108. Sigerist, "History of Medical Licensure", J.A.M.A. 104:1057-1060, 1935.

109. Sieverts, S., "Coordinating Institutional Plans to form a Comprehensive Regional Plan", Hospitals: 58-62, November 16, 1967.

110. Soderman, W.A., Continuing Education: The Interrelated Role of the Community Hospital, the Professional Society and the Medical School, Dis Chest 56:186-192, September 1969.

111. Somers, Anne R., Hospital Regulation: The Dilemma of Public Policy, Industrial Relations Section, Princeton University, 1969.

112. Soricelli, David A., Methods of Administrative Control for the Promotion of Quality in Dental Programs, American Journal of Public Health 58:1723-37, September 1968.

113. Standards for Approval by Medical Society of the State of New York of New York State Medical Care plans, New York State Journal of Medicine 61(Part I):1149-51, April 1, 1961.

114. Statement on role and responsibilities of hospitals in home care, Hospitals 38:84-86, July 1, 1964.

115. Stewart, W.H., "Medical Practice and the Organization of Health Services", Archives of Environmental Health: 815-818, December 1966.

116. Stewart, W.H., "The New Dimensions of Health Planning", Journal of the Louisiana State Medical Society: 488-492, December 1967.

117. "The Development of a Health Service Plan Where a Maldistribution of Health Resources Exists", Bedford-Stuyvesant Project, New York Contract No.: PH 108-64-85, July 31, 1965, pp. 1-15.

118. The 1968 National Health Forum, Quality In Health Care I, Challenges and Definitions; II, Action Proposals and Discussions; III Priorities and Resources. National Health Council, New York, 1968, 3v.

119. Trussell, Ray E., Proprietary Nursing Home Standards in New York City, American Journal of Public Health 56(8):1261-1270. August 1966.

120. U.S. Department of Health, Education and Welfare, Conditions of Participation; Extended Care Facilities, Federal Health Insurance for the aged, (Title 20, Chapter III, Part 405) Social Security Administration.

121. U.S. Department of Health, Education and Welfare, Education for the Allied Health Professions and Services; Report of the Allied Health Professions Education Subcommittee of the National Health Advisory Council, PHS, Bureau of Health Manpower, PHS Publication No. 1600, 1967.

122. U.S. Department of Health, Education and Welfare. Personnel Qualifications for Medicare Personnel: A Report to Congress. Washington: U.S. Government Printing Office, December 1968, 66 pp.

123. U.S. Department of Health, Education and Welfare, Social Security Administration, Health Insurance for the Aged: Conditions of Participation for Hospitals, Washington, D.C.: U.S. Government Printing Office, 1966, p. 39.

124. U.S. Public Health Service, Division of Hospital and Medical Facilities, Long-Term Care Facilities: General Standards of Construction and Equipment, Washington, 1960, 69 pp.

125. U.S. Public Health Service, Nursing Home Standards Guide, Public Health Service Publication No. 827, Washington, 1961, 63 pp.

126. U.S. Public Health Service, Planning and Equipping an Administration Department for 50-, 100-, and 200-Bed General Hospitals. Public Health Service Publication No. 892, Washington, 1961. 19 pp.

127. Weed, L.L., Medical Records, Medical Education and Patient Care, The Press of Case Western Reserve University, Cleveland, 1969, 249 pp.

128. Weinerman, E.R., "The Regional Concept", in Committee on Medical Care Teaching of the Association of Teachers of Preventive Medicine, Readings in Medical Care, Chapel Hill: University of North Carolina Press, 1958, 350-356.

129. White, Kerr L., Personal Incentives, Professional Standards, and Public Accountability for Health Care, Hospitals 42(14):74-8, July 16, 1968.

130. Wilbur, Dwight L, "Quality and Availability of Health Care Under Regional Medical Programs", Journal of the American Medical Association 23(11); 43-147, March 11, 1968.

131. Williamson, J.W., Continuing Education and Patient Care Research; Physician Response to Screening Test Results, J.A.M.A. 201:938-42, September 18, 1967.

132. Willis, D.P., "Regional Hospital Planning", Health News 38:17-18, September 1961.

133. Woodruff, I. Ogden, Quality Control of Medical Care Under a Prepaid Plan, Canadian Journal of Public Health 48:505-12, December 1957.

134. Worthington, William and Silver, Laurens H., "Regulation of Quality of Care in Hospitals; the Need for Change", Law and Contemporary Problems 35:305-33, 1970.

## CERTIFICATION OF THE NEED FOR AND THE VOLUMETRIC APPRAISAL OF MEDICAL CARE

1. *Altman, J., Some Factors Affecting Hospital Length of Stay, Hospitals, 39:68-73, 176. July 16, 1965.

2. *Ament, Richard P., Medicare Boosts Bed Usage by Elderly., Modern Hospital, Vol. 108, February 1967, pp. 81-82.

3. American Hospital Association. Guiding Principles for Hospital Utilization Review Programs. Hospitals 40:75, 76, 131, March 16, 1966.

4. American Hospital Association. Guiding Principles for Utilization Review Programs for Extended Care Facilities. Hospitals 40(15 Part I): 73, 76, 68, August 1, 1966.

5. Anderson, Odin W., Health Services Systems in the United States and Other Countries. Critical Comparisons, New England Journal of Medicine, October 17, 24, 1963, p. 319.

6. Anderson, R.C., A Comparative Analysis of Age as a Factor Affecting Length of Hospital Stay and Degree of Illness Within Certain Diagnostic Categories, Unpublished Master's Essay, Program in Hospital Administration, Dept. of Epidemiology and Public Health, Yale University School of Medicine. 1966. 114 pp.

7. Argyrou, S. Assessing Bed Needs: A Teaching Hospital With District Responsibility. The Hospital, Vol. 66. No. 7. July, 1970

8. Armstrong, C. R., Short-Term Admissions Unit Reduces Costs, Improves Utilization. Hospitals 43:48-49, 107 (February 16, 1969).

9. Arts, Sister M. Vivian, and Klauck, Sister M. Patrick, Utilization Review in Action. Hospital Progress, December 1966, pp. 65-72.

10. Auerbach, Aline B., Meeting The Needs of New Mothers, Children. Vol. 11, No. 6. November 1964, pp. 223-228.

11. Avnet, H., Physician Service Patterns and Illness Rates, A Research Report on Medical Data Retrieved From Insurance Records, New York: Group Health Insurance Inc., 1967, 452 pp.

12. *Bachrach, C. A., The Patient Record As a Source of Useful Statistics. Hospitals, 29:67-71, October 1955.

13. Bailey, D. R. and Riedel, D. C., Recertification and Length of Stay: The Impact of New Jersey's Aid Program on Patterns of Hospital Care. Blue Cross Rep., 6:1-10, July 1968.

14. Barnhart, Gilbert R., A Note On The Impact of Public Health Service Research on Poverty. Journal of Social Issues. Vol. 21, No. 1, January 1965, pp. 142-149.

15. Barr, A., The Population Served by a Hospital Group, Lancet: 1105-1108 (November 30, 1957).

16. Barr Report. Secretary's Advisory Committee on Hospital Effectiveness, U.S. Dept. of HEW, 1968.

17. Bartlett, W., Measuring Patient Care, Med. Rec. News, 34:195-6, 222-5. 1963.

18. Begin, J. L., Utilization Review: Applicability and Implication at an Air Force Hospital, Unpublished Master's Thesis, Program in Hospital Administration, U. of Michigan. 1967. 87 pp.

19. Belknap, Ivan, and Steinle, John G., The Community and Its Hospitals: A Comparative Analysis, Syracuse, Syracuse U. Press, 1963.

20. Berg, R. L., Browning, F. E., Crump, S. L., and Wenkert, W., Bed Utilization Studies for Community Planning, J. Amer. Med. Assn. 207:2411-2413. March 31, 1969.

21. Berg, R. L., Browning, F. E., Hill, J. G., et.al: Assessing the Health Care Needs of the Aged. Health Serv. Res. 5:36-59, 1970.

22. Berkman, B. and others, Utilization of In-Patient Services by the Elderly, J. Amer. Geriat. Soc. 19:933-46 N. 1971.

23. Berry, C.E., Medical Audit Is the Doctor's Task-But Administration Must Help, Hosp. Progr., 35:81-2. May 1954.

24. Bevan, J., Sampling Problems in Studies of General Practice. Med. Care 3:168-179, July – Sept. 1965.

25. *Bice, T.W., White K.L., Cross-National Comparative Research on Utilization of Medical Services, Med. Care 9:253-271, 1971.

26. Bierman, Pearl, Myers, Beverlee, Rodak, John, and Reibel, Jay, Certifying Independent Laboratories Under Medicare. Public Health Reports, Vol. 83, Sept. 1968, pp. 731-39.

27. Blanpain, J. E., Methods of Assessment of Requirements in Health and Hospital Care, Acta. Hosp. 10:227-33, Fall 1970.

28. Blue Cross Association, Guide to Utilization Review for Extended Care Facilities Chicago, Professional Relations Division, The Association, 1967, 27 pp.

29. Bogart, Dodd H., and Hagerty, Thomas F., "Use of Patient Care Statistics in the Community Hospital: A Study in Organizational Change." Research Report, Ann Arbor: Center for Research on Utilization of Scientific Knowledge, Institute for Social Research, University of Michigan, November 17, 1966.

30. Bogart, Dodd H., and/or Josephson, Carl, "Computerized Screens Section." Detroit: Michigan Medical Service, 1969. (Mimeographed.)

31. Botts, William H., Implementation of Medicare in the Smaller Institution, Hospitals, Journal of the American Hospital Association, Vol. 40, June 1, 1966, pp. 46-50.

32. Boulding, K., The Concept of Need for Health Services, Milbank Memorial Fund Quarterly, Vol. 44, No. 4, Oct. 1967. pp. 202-223.

33. Brenner, R. L., Fahey, J. M., and Reid, C., Hottest Volcano in Medicine: Over-Utilization, Med. Econ. 41:59-129. July 13, 1964.

34. Breslow, Lester, Changing Patterns of Medical Care and Support, Journal of Medical Education, Vol. 41, April 1966, pp. 318-324.

35. *Breslow, Lester, New Partnerships in the Delivery of Services A Public Health View of the Need, American Journal of Public Health and the Nation's Health, Vol. 57, July 1967, pp. 1094-1099.

36. Brodie, Donald C., Drug Utilization and Drug Utilization Review and Control (Available from original publisher).

37. Buie, Louis A., Sr., Specialty Certifying Boards in American Medicine. Brit. Med. J. 1:543-7, Feb. 27, 1965.

38. *Cashman, J. W. and Myers, Beverlee, A., Medicare: Standards of Service in a New Program – Licensure, Certification, Accreditation, Amer. J. Publ. Hlth, 57:1107-17, July 1967.

39. *Certified Hospital Admission Program (CHAP). Work in progress. Developed by the Medical Care Foundation of the Sacramento County Medical Society. Third Printing – July 1971.

40. *Certified Hospital Extension of Care (CHEC). Work in progress. Developed by the Georgia Medical Care Foundation of the Medical Association of Georgia.

41. *Ciocco, A., Burnet, M. D., and Altman, I., Measures of Medical Resources and Requirements. Medical Care, Vol. 3, November 1943.

42. *Ciocco, A., Davis, B., and Altman, I.: Measures of Medical Resources and Requirements, Medical Care 3(4):314-326 (Nov.) 1943.

43. Ciocco, A., Hunt, H., and Altman, I., Statistics on Clinical Services to New Patients in Medical Groups, Publ. Hlth. Rept., 65:99-115, 1950.

44. Clark, Welden E., Clark, Virginia A., and Souder, James J., "Data for Planning from Health Information System Sources," Inquiry, V (September 1968), pp. 5-16.

45. Cobb, S., On the Development of Diagnostic Criteria, Arthritis Rheum., 3:91-5, 1960.

46. Coe, Rodney M., et.al., The Impact of Medicare on the Utilization and Provision of Health Care Facilities: A Sociological Interpretation. Inquiry, Vol. 4, Dec. 1957, pp. 42-46.

47. Colombotos, J., Physicians' Responses to Changes In Health Care: Some Projections, Inquiry 8:20-26, March 1971.

48. Commission on Chronic Illness. Chronic Illness in the U.S. Vol. II: Care of the Long Term Patient. Cambridge: Harvard U. Press, 1956, 606 pp.

49. Commission on Professional and Hospital Activities, Inc., The Aged Hospital Patient: A Statistical Profile, Ann Arbor: CPHA, c. 1965.

50. Commission on Professional and Hospital Activities: Length of Stay in PAS Hospitals, U.S. Regional, 1969, Ann Arbor, Michigan, 1970.

51. Commission on Professional and Hospital Activities: Length of Stay in Short-Term General Hospitals 1963-1964, New York: The Blakiston Division, McGraw-Hill Book Co., 1966, 216 pp.

52. *Concurrent On-Site Evaluation and Review Effort (CONSERVE). Work in progress. Developed by the Multnomah Foundation for Medical Care and the Multnomah Experimental Medical Care Review Organization of the Multnomah County Medical Society (Portland, Oregon).

53. Continuity of Care Through Discharge Planning, U.S. Depart. of HEW, Public Health Service, Health Services and Mental Health Administration, Community Health Service, 5600 Fishers Lane, Rockville, Maryland 20852.

54. Converse, M. E., Identification of a Common Discharge Data Set for All Short-Term General Hospitals, Med. Rec. News 42:54-7, Dec. 71.

55. Coordination of Utilization Review and Patient Placement for Medicare Recipients, Stanislaus County Medical Society, 709 18th Street, P. O. Box 1755, Modesto, Calif. 95354, April 1970.

56. *Copeland, William C., "A New Approach to Hospital Information Systems: The Design of Hospital Report Generators for Statistical Reports to Agencies Outside the Individual Hospital," Inquiry, IV (March 1967), 37-43.

57. Cordero, Ana Livia, The Determination of Medical Care Needs in Relation to a Concept of Minimal Adequate Care: An Evaluation of the Curative Outpatient Services of a Rural Health Centre, Med. Care 2:95-103, April – June 1964.

58. Cottrell, J. D., The Consumption of Medical Care and the Evaluation of Efficiency, Med. Care, 4:214-36, 1966.

59. Cristo, Carmen, Handbook: The Extended Care Facility and Utilization Review. In The Extended Care Facility: A Handbook for the Medical Society, Chicago: American Medical Asso. 1967, pp. 17-48.

60. Criteria for Effective Utilization Review, Pittsburgh, Pa., Hospital Utilization Project (3530 Forbes Ave.) 1969.

61. Croatman, Wallace, Progressive Patient Care, What It Means for You. Medical Economics 36:74-81 (Dec. 21, 1959).

62. Current Bibliography of Epidemiology, A Guide to the Literature of Epidemiology. Preventive Medicine and Public Health Asso., (Jan.) 1969.

63. Daily, Edwin F., and Morehead, Mildred A., "A Method of Evaluating and Improving the Quality of Medical Care," American Journal of Public Health, XLVI (July 1956), pp. 848-54.

64. *Dame, Lawrence R., "Hospital Profiles," JAMA, CXCVI (June 20, 1966), pp. 1068-71.

65. Davies J., Toward a Measure of Medical Care, London, Oxford University Press, 1962.

66. *Decker, Barry and Bonner, Paul (ed.) PSRO: An Evaluation of Functional Specifications and the Availability of Necessary Criteria and Methodologies. Unpublished report by Arthur D. Little, Inc., for Health Services and Mental Health Administration under Contract HSM 110-72-325, November 1972.

67. Densen, P. M., Balamuth E., Deardorff, N., Medical Care Plans as a Source of Morbidity Data. The Prevalence of Illness and Associated Volume of Service, Milbank Mem. Fund Quart. 38:48-101, 1960.

68. Densen, P. M., Balamuth, E., and Shapiro, S., Prepaid Medical Care and Hospital Utilization, Abstracted, Hospitals 32:50 (March 1) 1958.

69. *Densen, P.M., Balamuth, E., and Shapiro, S., Prepaid Medical Care and Hospital Utilization, Chicago, American Hospital Association Hospital Monograph Series No. 3, 1958, 55 pp.

70. Densen, P. M., Jones, E. W., Balamuth, E., and Shapiro, S., Prepaid Medical Care and Hospital Utilization in a Dual Choice Situation, Amer. J. Publ. Hlth., 50:1710-26, 1960.

71. Densen, P. M., The Quality of Medical Care, Yale J. Biol. Med. 37:523-36, June 1965.

72. Detloff, V., Drosness, D., and Riback, N., Utilization of Health Facilities and Services, 1950-1963 (An Annotated Selected Bibliography), Berkeley, Calif., California Dept. of Public Health, 1964, 72 pp.

73. Direct Utilization Review Surveys of Hospitals, Regional Health Insurance Letter No. 70-39, Dept. of HEW, Social Security Administration, Bureau of Health Insurance.

74. *Donabedian, A., and Attwood, J. C., An Evaluation of Administrative Controls in Medical-Care Programs. New England Journal of Medicine 269 (August 15, 1963):347-354.

75. Donabedian, A., Aspects of Medical Care Administration, Harvard University Press, Cambridge, Mass., in press.

76. Donabedian, A., Evaluating the Quality of Medical Care, Milbank Mem. Fd. Quart. 44(3): 166-206 (Part 2) July 1966.

77. *Donabedian, A., A Guide to Medical Care Administration: Vol. II, Medical Care Appraisal. American Public Health Association, 1969.

78. Donnelly, Paul R., and Kincaid, William H., "What is P.A.S. Really Like?" Hospital Progress, XLII (July 1961), 49-52.

79. Doran, William T., Jr., The Medical Audit:A Tool in Appraising Occupational-Health Programs, J. Occup. Med. 6:221-6, May 1964.

80. Dorn, R. V., Medicare and Utilization Review, The Lovelace Clinic Review, Vol. 2, No. 4, 1966, pp. 112-23.

81. Dorsness, D. L., Dean, L. S., Lubin, J. W., and Ribak, N., Uses of Daily Census Data in Determining Efficiency of Units, Part I, Hospitals, 41:65-68, 112, Dec. 1967.

82. Dougherty, William J., M.D., Health Needs of Migrant Workers, Public Health News (New Jersey), Sept. 1965.

83. Dumke, P. R., Utilization Review – As a Part of Peer Review, ASA Amer. Soc. Anesthesiologists Newsletter 35:1 June 1971.

84. *Durbin, Richard L., and Antelman, Gordon, "A Study of the Effects of Selected Variables on Hospital Utilization," Hospital Management, XCVIII (August 1964), pp. 57-60.

85. Eberle, Betty, A Stochastic Model for Hospital Admissions and Discharges. Biometrics 23:376 (June 1967).

86. Elinson, J., Methods of Sociomedical Research, Handbook of Medical Sociology, edited by H. Freeman, S. Levine and L. Reeder, Englewood Cliffs, New Jersey, Prentice Hall, Inc., 1963.

87. *Ellenbogen, Bert L., Ramsey, Charles E., and Danley, Robert A., Health Need, Status, and Subscription to Health Insurance, Journal of Health and Human Behavior, Vol. 7, No. 1, Spring 1966.

88. *Ellwood, Paul M., and Riedel, Donald C., "Some General Comments on Methods of Studying Hospital Use," Inquiry, I (January 1964), pp. 49-68.

89. *Ellwood, Paul M., "Quantitative Measurement of Patient Care Quality: Part 1 – Measures of Care," Hospitals, J.A.H.A., XL (December 1, 1966), pp. 42-45.

90. *Ellwood, Paul M., "Quantitative Measurement of Patient Care Quality: Part 2 – A System for Identifying Meaningful Factors," Hospitals, J.A.H.A., XL (December 16, 1966), pp. 59-63.

91. *Ellwood, Paul M., "Utilization Review and Control Activities in Blue Cross Plans," Blue Cross Reports, IV (January – March 1966), pp. 1-12.

92. Emrich, R.A., and Zak, E. J., Computer Assists in Utilization Review, Hospitals, 42:56-59, August 1, 1968.

93. Ensign, J. M., Third-Party Review Programs from the Blue Cross Vantage Point, J. Amer. Med. Assn., 196:1006-7, 1966. (From Proceedings of 1965 Conference on Utilization Review)

94. Extended Care Facility Regional Utilization and Medical Review Project, Handbook: The Extended Care Facility – Utilization Review, Rochester, The Project, 28 pp.

95. *Falk, I. S., Klem, M. C., and Sinai, N. The Incidence of Illness and the Receipt and Costs of Medical Care Among Representative Families. Publication No. 26 of the Committee on the Costs of Medical Care, University of Chicago Press, 1933.

96. Falk, I. S., Schonfeld, H. K., et.al., The Development of Standards for the Audit and Planning of Medical Care, 1: Concepts, Research Design, and the Content of Primary Physician's Care, Amer. J. Publ. Hlth., 57:1118-36, 1967.

97. *Falk, S., Average Length of Stay in Long-Term Institutions. Health Serv. Res. 6:251-5, Aug. 1971.

98. Fanning, Robert R., Jr., The Evolution of Utilization Review and Its Practical Application in a Teaching Hospital.

99. Felch, W.C., Data Processing and Peer Review, Med. 27:295-7, Aug. 1971.

100. Feldstein, M.S., Effects of Differences in Hospital Bed Scarcity on Type of Use, Brit. Med. J., 2:561-4, 1964.

101. Felstein, Paul J., Research on the Demand for Health Services, Milbank Memorial Fund Quarterly, Part I, Vol. 44, No. 3, July 1966, pp. 128-162.

102. Ferber, Bernard, Inpatient Hospital Utilization of Pittsburgh, Pennsylvania Residents, 1963.

103. Ferraro, Rose G., The Essence of Utilization Review – The Welfare of the Patient, ANA Clinical Conferences, Atlanta/Minneapolis: American Nurses' Association, 1969.

104. Figge, David C., Bennington, James L., A Study of the Epidemiology of Cervical Cancer, American Journal of Obstetrics and Gynecology, Vol. 98, June 1967, pp. 516-525.

105. Fitzmaurice, Sister Marynita, Lawrence, Robert, and Weygant, Gary, "Implementation of a Basic Utilization Review Program." Unpublished essay, New Haven, Connecticut: Department of Epidemiology and Public Health, Yale University, May 30, 1968. (Mimeographed.)

106. *Fitzpatrick, T. B., How Effective are Utilization Committees? Hospitals, 40:45-50, September 1, 1966.

107. *Fitzpatrick, T. B., The Research Function within Prepayment Plans and Its Relation to Utilization Review, Inquiry, 3:18-33, May 1966.

108. Fitzpatrick, T. B., Riedel, D. C., and Payne, B. C., Character and Effectiveness of Hospital Use, in McNerney, W. J., et.al., Hospital Research and Educational Trust, American Hospital Association 1962, pp. 361-591.

109. Fitzpatrick, T. B., Riedel, D. C. and Payne, B. C., Some General Comments on Methods of Studying Hospital Use, Inquiry, 1:49-68, Jan. 1964.

110. *Fitzpatrick, T. B., Utilization Review and Control Mechanisms: from the Blue Cross Perspective. Inquiry 2 (September 1965): 16-29.

111. Forgotson, E. H., Professional Accreditation, Certification and Official Licensure as Assurances of High Quality Health Care. Quality in Health Care, Report of the 1968 National Health Forum, U. S. Dept. of HEW, Public Helath Service, II: 15-30, 1968.

112. Forsyth, G., and Logan, R.F.L., The Demand for Medical Care: A Study of the Case-Load in the Barrow and Furness Group of Hospitals, London, Oxford U. Press, 1960, 153 pp.

113. *Foster, John T., "Utilization Review is a Great Idea, But Does It Affect Utilization?" The Modern Hospital, CX (February 1968), pp. 95-96, 101.

114. Foundations for Medical Care, Report No. 2, Management Info. Services, Planning and Programming Division, National Assoc. of Blue Shield Plans, 211 East Chicago Avenue, Chicago, Ill., 60611

115. Franzi, A. J., Utilization Review Study in Hospitals, GP, 33:181-3, June 1966.

116. Fry, J., Five Years of General Practice: A Study in Simple Epidemiology, Brit, Med. J., 2:1453-1457, 1957.

117. Furbacher, Raymond, and Schechter, Gerald, Recertification Programs. Inquiry 2 (2):59-63, Sept. 1965.

118. Garratt, F. N., Lowe, C. R., and McKeown, T., An Investigation of the Medical and Social Needs of Patients in Mental Hospitals, Brit. J. Prev. Soc. Med. 11:165-73, 1957 and 12:23-41, 1958.

119. Garrison, Glen E., McDonough, John R., Hames, Curtis G., and Stulb, Sarah C., Prevalence of Chronic Congestive Heart Failure in the Population of Evans County, Ga., Amer. J. of Epidemiology, Vol. 83, March 1966, pp. 338-344.

120. German, J., and Feldstein, P., Predicting Hospital Utilization: An Evaluation of Three Approaches, Inquiry I(1): 45-46 (August) 1963.

121. Gibson, C. D., Jr., and Kramer, B., Site of Care in Medical Practice, Med. Care 3:14-17, Jan. – Mar. 1965.

122. Goldmann, F., Prolonged Stay in General Hospitals: A Study of 200 Patients, Geriatrics, 14:789-800, 1959.

123. Gonnerman, Alice M., After Hospitalization What? Discharge Planning Offers Answers. Hospitals 43:81-86, (April 16, 1969).

124. Gordon, P. C., An Approach to Patient Care Classification. Canadian Medical Association Journal 95:1228-1236, Dec. 10, 1966.

125. Greenlick, M. R., Conceptual Issues in the Analysis of Medical Care Utilization Behavior. DHEW, HSMHA Conference Series, Oct. 1969.

126. Greenlick, M. R., Hurtado, A. V., Pope C. R., et.al. Determinants of Medical Care Utilization. Health 56:1193-1198, Aug. 1966.

127. Gregory, S.R., Two Medical Staff Committees, One Direction: Toward More Efficient Use of Hospital Beds, Hospitals, 37:60-4, 126, Aug. 16, 1963.

128. Griffith, John R., Investigations into Progressive Patient Care: A New Concept of Hospital Organization. Inquiry 1:81-8, Jan. 1964.

129. *Griffith, John R., Quantitative Techniques for Hospital Planning and Control. Lexington: D. C. Heath and Company (Lexington Books), 1972, 403 pp.

130. Griffith, John R., Research in Hospital Management: Is Utilization Review Worth It? Hospital Ad., Vol. 14, No. 4, Fall 1969, pp. 4-9.

131. Guidelines for Utilization Review as Required by Medicare, Focus on Utilization Review; Hospital Utilization Project. Special Report, Dec. 1970, 3530 Forbes Ave., Pittsburgh, Penn. 15213.

132. *Gustafson, D. H., Length of Stay: Prediction and Explanation, Hlth. Serv. Res., 3:12-34, Spring 1968.

133. Hamburg, A. Z., and LaBoccetta, A. C., M.D., System Expedites Medicare Certification Procedures, Hospitals, Vol. 42, November 16, 1968, pp. 72-73.

134. Handbook: The Extended Care Facility and Utilization Review, Rochester, Regional Utilization and Medical Review Project, 1967, 28 pp.

135. *Health Services Foundation. Uniform Hospital Discharge Data. Prepared for the National Center for Health Services Research and Development, Grant HS 00400, Washington, D. C. Government Printing Office, Publication No. (HSM) 72-3025, 1972, 21 pp.

136. Hess, A.E., Medicare and Utilization Review, J. Amer. Med. Assn. 196:955-8, 1966. (From Proceedings of 1965 Conference on Utilization Review)

137. Hess, I., and Srikantan, K. S., Some Aspects of the Probability Sampling Technique of Controlled Selection, Hlth. Serv. Res. 1:8-52, 1966.

138. Hess, I., Riedel, D., Fitzpatrick, J., Probability Sampling of Hospitals and Patients. Bureau of Hospital Administration. Research Series No. 1. The University of Michigan, Ann Arbor, Michigan, 1961.

139. H.I.P. Statistical Report – 1968 Enrollment and Utilization Statistics, 1969 Research Project Results, Division of Research and Statistics, Health Insurance Plan of Greater N. Y.

140. Hoffer, Charles R., and Edgar Schuler, A Measurement of Health Needs and Health Care, American Sociological Review, Vol. 13, Dec. 1948, pp. 719-724.

141. Holtz, C. L., Jr., and Keyes, M. A., Regional Differences in the Use of Hospital Days. PAS (Prof. Activ. Study) Reporter 9:1-5, Aug. 16, 1971.

142. Horvitz, D. G., Methodological Considerations in Evaluating the Effectiveness of Programs and Benefits, Inquiry, 2:96-104, Sept. 1965.

143. *Hospital Admission and Surveillance Program (HASP). Work in progress. Developed by the Illinois Foundation for Medical Care of the Illinois State Medical Society.

144. *Hospital Admission Precertification Program (HAPP). Work in progress. Developed by the New Mexico Foundation for Medical Care of the New Mexico Medical Society.

145. *Hospital Research and Educational Trust. Common Data Set for Hospital Management. Prepared for the National Center for Health Services Research and Development, Contract No. HSM 110-71-37, Washington, D. C. Government Printing Office, Publication Number (HSM) 72-3026, 45 pp.

146. *Hospital Service Plan of New Jersey, Approval by Individual Diagnosis, Newark, N.J., 1965, 32 pp.

147. Hospital Utilization, The Pennsylvania Medical Journal, Vol. 68, Oct. 1965, p. 58.

148. Hospital Utilization Project, Focus on Utilization Review, 3530 Forbes Avenue, Pittsburgh, Penn., 15213. Published from Nov. 1968 to date on Selected Topics.

149. Hospital Utilization Project, Guide to the Establishment and Functioning of a Medical Staff Utilization Committee, Pittsburgh, Blue Cross of Western Pa., 1965 (Rev. Ed.), 339 pp.

150. The How and Why of a Utilization Committee, Hospital Care Corporation, Cincinnati, Undated, 16 pp.

151. *Howland, Daniel, and McDowell, W. E., "The Measurement of Patient Care – A Conceptual Framework," Nursing Research, XIII (Winter 1964), pp. 4-7.

152. How They Review Extended-Care Patients, Med. Econ., 44:98-104, Nov. 27, 1967.

153. Hulka, Barbara S., Motivation Techniques in a Cancer Detection Program: Utilization of Community Resources, American J. of Public Health and The Nation's Health, Vol. 57, Feb. 1967, pp. 229-241.

154. Huntley, R., Epidemiology of Family Practice, JAMA 185(3): 175-178, July 1963.

155. Hutchison, W. A., Developing Progressive Patient Care Areas, Hospital Management 94:39-43 (Sept. 1962).

156. Innes, A., Grant, A. J., and Beinfield, M. S., Experience with Shortened Hospital Stay for Postsurgical Patients, J. Amer. Med. Assn., 204:647-52, May 20, 1968.

157. Jacobs, A. R., and others, Emergency Department Utilization in an Urban Community: Implications for Community Ambulatory Care. J. Amer. Med. Assoc. 216:307-12, April 12, 1971.

158. *Jeffers, J.R. and others. On the Demand Versus Need for Medical Services and the Concept of Shortage. Amer. J. Public Health 61:46-63, Jan. 1971.

159. Jesmer, S., and Scharfenberg, R.K., Problems in Measuring the Effect of Deductibles upon Hospital Utilization, Blue Cross Rep., 6:1-7. Oct. 1968.

160. Johnston, Helen L. and Lindsay, J. Robert, M.D., Meeting the Health Needs of the Migrant Worker, Hospitals, Vol. 39. July 16, 1965.

161. *Joint Commission on Accreditation of Hospitals. Standards for Hospital Accreditation. Chicago, 1964, 10 pp.

162. Jones, F. Avery, Length of Stay in Hospital. Lancet 1:321-323, Feb. 8, 1964.

163. Josephson, C., Utilization Review Systems: Characteristics and Operation, Mich. Med., 67:1101-1103. Sept. 1968.

164. Kelman, Howard R., et.al. "Monitoring Patient Care," Medical Care, VII (January-February 1969), pp. 1-20.

165. Kernodle, J.R., Prepayment Voluntary Insurance-Utilization and Review Committees, N.C. Med. J., 24:133. March 1963.

166. Kerr, M., and Trantow, D.G. Perspectives – and a Suggested Framework – for Defining, Measuring, and Assessing the Quality of Health Services, Health Services and Mental Health Admin., U.S. Public Health Service. 1968, pp. 38-76.

167. Kincaid, W.H., and Bhatia, M., Length of Stay: Friday and Saturday Admissions, PAS Reporter, 5:1-2. July 24, 1967.

168. Kisch, A.I., Kover, J.W., The Relationship Between Health Status and Utilization of Outpatient Services. Arch Environ Health 18:820-833, 1969.

169. Klein, M.W., Malone, M.F., Bennis, W.G, and Berkowitz, N.H. Problems of Measuring Patient Care in the Out-Patient Department, J. Hlth. Hum. Behav. 2:138-44, 1961.

170. Klutch, M., Medical Society Review Committee, Inquiry, 2:70-6. Sept. 1965.

171. Knox, G.S., How Often are We Wrong? Or the Epidemiology of Doctor Error. J. Okla. Med. Asso. 57:494-500, Nov. 1964.

172. Koen, Mary E., "Hospital in Profile," Inquiry, II (September 1965), pp. 43-58.

173. Koen M.E., 1965 Patient Profiles-Average Stay. Most Frequent Diagnoses, Boston, Mass. Blue Cross Inc. Sept. 1967, 39 pp.

174. *Kolb, Jonathan, and Sidel, Victor W., Influence of Utilization Review on Hospital Length of Stay. JAMA 203:95-7, Jan. 8, 1968.

175. Kolouch, F.T., Computer Shows How Patient Stays Vary, Mod. Hosp. 105:103-4. Nov. 1965.

176. Last, J.M., The Measurement of Medical Care in General Practice. Med. J. Australia 1:280-2. Feb. 20, 1965.

177. Lea Associates, Inc., The Current Impact of Medicare on U.S. Private Medical Practice. National Disease and Therapeutic Index, Medical Report No. 24, Ambler, Penn.: The Asso. Jan. 1967, 5 pp.; and No. 25, May 1967, 5 pp.

178. *Lee, R.I., and Jones, L.W. The Fundamentals of Good Medical Care. Publication No. 22 of the Committee on the Costs of Medical Care. University of Chicago Press, 1933.

179. Leighton, Eric and Headley, Peter, Computer Analysis of Length of Stay. Hosp. Prog. 49(4):67-70, April 1968.

180. Leighton, Eric, "Proposal to Develop Exception Reporting of Hospital Utilization Statistics." Draft paper. San Francisco: CHDC, July 28, 1969. (Typewritten.)

181. Lembcke, P.A., Measuring the Quality of Medical Care Through Vital Statistics Based on Hospital Service Areas: 1. Comparative Study of Appendectomy Rates, Amer. J. Publ. Hlth. 42:276-86. 1952.

182. Lembcke, P.A., A Scientific Method for Medical Auditing, Hospitals 33:65-71. June 16, 1959 and pp. 65-6, 70-2, July 1, 1959.

183. Lerner, M. and Fitzgerald, S., A Comparative Study of Three Major Forms of Health Care Coverage: A Review. Inquiry. Vol. 2. No. 1. June 1965, pp. 37-60.

184. Lerner, Monroe, and Riedel, Donald C., The Teamster Study and the Quality of Medical Care. Inquiry 1:69-80, Jan. 1964.

185. Lerner, Monroe, Some Aspects of the Increase in Inpatient Hospital Utilization and Charges, 1956 to 1961, in the Experience of the Indiana Blue Cross, Blue Cross Reports 4(2):1-15 (April-June) 1966.

186. LeRocco, August. Planning for Hospital Discharge: A Bibliography with Abstracts and Research Reviews. HEW, PHS, Health Services and Mental Health Administration, National Center for Health Services Research and Development, Aug. 1970. HSRD-70-17.

187. Letourneau, Charles U., and Ehl, B., Hospital Utilization Review, Hosp. Mgmt., 102:32-6. July 1966.

188. Letourneau, Charles U., "A Look at Utilization," Hospital Management, XCIV, September 1962, pp. 47-50.

189. Lew, I., Day of the Week and Other Variables Affecting Hospital Admissions, Discharges, and Length of Stay for Patients in the Pittsburgh Area, Inquiry, 3:3-39, Feb. 1966.

190. Lewis, C.E., Continuing Medical Education: An Epidemiologic Evaluation. N. Engl. J. Med. 282:254-259, Jan. 29, 1970.

191. Lewis, Paul M., "The Hospital Utilization Project of Pennsylvania," Public Health Reports, LXXXIII, September 1968, pp. 743-50.

192. Littman, D.L., A Model of Demand for Medical Care in Low Income Neighborhoods, New York, Hunter College, Urban Research Center. 1967.

193. London, Morris, and Nave, J.A., Western Penn. Pioneers with Special Utilization Project, Hosp. Topics, 42:47-51, Aug. 1964.

194. London, Morris, "How a Utilization Committee Can Contribute to Administration," Hospitals, J.A.H.A., XXXVIII, July 1, 1964, pp. 32-35, 98.

195. London, Morris, Medical Staff Utilization Committees, Inquiry, 2:77-95, Sept. 1965.

196. London, Morris, Utilization Committees, Med. Rec. News, 34:149-52, 175-6. 1963.

197. Long, E.C., Medical Specialization and World Health Needs, J. Amer. Med. Asso. 217:1688-90 S.-20 1971.

198. Lonni, Louis J. and Bradley, Iver E., Medicare: A Statistical Study on Utilization. Hospital Management, May 1966. Vol. 101, pp. 29-33.

199. Lonni, Louis J., and Luttman, Roger, PAS Finds the Elderly Are Staying Longer in Smaller Hospitals, Modern Hospital, Vol. 109, Aug. 1967, pp. 106-107.

200. Mackintosh, J.M., McKeown, T. and Garrett, F.N., An Examination of The Need for Hospital Admission, Lancet, 1:815-18. 1961.

201. Marcom, E.M., Medical Staff Utilization Committees: Development and Effectiveness, Unpublished Master's Thesis, School of Public Health, Duke University, 1965, 71 pp.

202. Massachusetts Blue Cross, Proceeding of a Seminar on Health Care Utilization, Boston, Nov. 1969. (With Mass. Medical Society.)

203. Massachusetts Blue Cross, Inc., A Report on Hospital Utilization Review Committee Activity. HCR/115. Boston: Massachusetts Blue Cross, Inc., April 1969.

204. McCarthy, T., Need for and Support of Health Services Research. Med. Care 6:490-495. 1968.

205. McClain, John O., Aids to Utilization Review: A Decision Problem In A Hospital Setting. Graduate School of Yale U., New Haven, Conn., 1970.

206. McClenahan, J.E., Applying the Results of Utilization Measurement, Utilization Review: A Handbook for the Medical Staff, Chicago, American Medical Asso., pp. 39-51, 1965.

207. McClenahan, J.E., Hospital Utilization – A Medical Society Prescribes a Remedy, Trustee, 15:1-6, Sept. 1962.

208. McClenahan, J.E., Hospital Utilization Reviews, J. Amer. Med. Assn., 196:999-1004. 1966. (From Proceedings of 1965 Conference on Utilization Review.)

209. McClenahan, J.E., Utilization Review Under Medicare, Hospitals, 39:55-9. Sept. 1965.

210. McCorkle, Lois P., Utilization of Facilities of a University Hospital: Length of Inpatient Stay in Various Departments. Hlth. Serv. Res. 1(1):91-114, Summer 1966.

211. McNerney, Walter J. and others. Hospital and Medical Economics: A Study of Population, Services, Costs, Methods of Payment, and Controls, Chicago, Hospital Research and Educational Trust, 1962.

212. Medical Care Evaluation Studies; A Utilization Review Requirement Goldberg, G.A., JAMA 220:383 – April 17, 1972.

213. Medical Care Facilities Utilization: Pre- and Post-Medicare, Menlo Park: Stanford Research Institute, Dec. 1968, 212 pp.

214. Medicare: Analysis of Days of Care – Methodology. U.S. Dept. HEW Social Security Administration, Office of Research and Statistics, Sept. 1970.

215. Michigan Dept. of Public Health, Miscellaneous Papers on Utilization Review in Hospitals and Extended Care Facilities (mimeo) 1957 and other dates, Lansing, Michigan.

216. *Mikelbank, G., "Approval by Individual Diagnosis (AID) Program New Jersey Blue Cross." Paper prepared for the Workshop on Medical Care Appraisal-Operational Aspects (November 11 and 12, 1966). New York: American Public Health Association, Program Area Committee on Medical Care Administration. 11 pp. and appendices (Mimeographed).

217. Montague, Francis, Measuring the Utilization of a Federal Short Term General Hospital Program in Hospital Administration. The University of Iowa, Iowa City, Iowa, 1966.

218. * Morehead, M.A., "The Medical Audit as An Operational Tool." Paper prepared for the Workshop on Medical Care Appraisal – Operational Aspects (November 11 and 12, 1966). New York: American Public Health Association, Program Area Committee on Medical Care Administration. Subsequently published in American Journal of Public Health 57 (September 1967):1643-1656.

219. Morisse, Robert F., "Development of a Basic Utilization Review Program." Unpublished Master's Essay. New Haven, Connecticut: Department of Epidemiology and Public Health, Yale University, 1968. (Mimeographed.)

220. Morrell, D.G., Gage, H.G., and Robinson, N.A., Patterns of Demand in General Practice. J. Roy. Coll. Gen. Practit. 19:331-342. 1970.

221. Morris, D., and Hadyside, A.J., Effects of Methods of Admitting Emergencies on Use of Hospital Beds. Brit. J. Prev. Soc. Med. 25:1-11, F. 1971.

222. Morton, J.H., Williams, J.S., and Kutner, F.R., Evaluation of Surgical Bed Utilization, Arch. Surg., 97:395-405. Sept. 1968.

223. Murnaghan, J.H., and White, K.L., (eds): Hospital Discharge Data, Report of the Conference on Hospital Discharge Abstracts Systems. Philadelphia, J.B. Lippincott Co., 1970.

224. Murnaghan J.H., and White, K.L., Hospital Patient Statistics: Problems and Prospects. New Eng. J. Med. 284:822-828. 1971.

225. *Myers, Robert S., and Slee, V.N., How to Make Length of Stay Make Sense, Mod. Hosp., 93:91-9. Dec. 1959.

226. Myers, Robert S., and Slee, V.N., Medical Statistics Tell the Story at a Glance. Mod. Hosp. 93:72-5. Sept. 1959.

227. Myers, Robert S., Hospital Statistics Don't Tell the Truth, Mod. Hosp. 83:53-54, July 1954.

228. Myers, Robert S., Slee, Vergil N. and Ament, Richard P., Antibiotic Study Shows Need for Therapy Audit. Mod. Hosp. 100(3):120-4. March 1963.

229. Myers, Robert S., Slee,V.N., and Hoffmann, R.G., Medical Audit Protects the Patient, Helps the Physician, and Serves the Hospital, 85:77-83. Sept. 1955.

230. Myers, Robert S., Utilization Committees Are Now Recognized as Essential, Mod. Hosp., 98:118-122. Feb. 1962.

231. Nave, J.A., and London, M., Utilization Committees: Treat or Challenge. Pa. Med. J., 66:23-7. Sept. 1963.

232. Neir, John H., A Study on the Effect of Age and Length of Stay for Patients in Four Diagnostic Categories on Utilization of Laboratory and X-Ray Services in a General Hospital. U. of Minnesota, Minneapolis, Minn., 1970.

233. Office of Research and Statistics: The Impact of Medicare – An Annotated Bibliography of Selected Sources. U.S. Depart. of HEW, Social Security Administration, 1969 (SS Pub 69-67). (12-69).

234. O'Malley, M., and Kossack, C.F., A Statistical Study of Factors Influencing the Quality of Patient Care in Hospitals, Amer. J. Publ. Hlth. 40:1428-36. 1950.

235. *On-Site Concurrent Hospital Utilization Review (OSCHUR). Work in progress. Developed by the Utah Professional Review Organization of the Utah State Medical Association.

236. Pallett, P., The Development of a Mechanism for Abstracting Medical Records for Utilization Review, Unpublished Master's Thesis, Medical Care Program, Dept. of Epidemiology and Public Health, Yale U. School of Medicine, May 1969, 219 pp.

237. Palmiere, D., Medicare's Effects on Medical Care: Community-Based Approaches to Utilization Review, Publ. Hlth. Rep., 83:705-707. Sept. 1968.

238. Parker, G.E., The Value of Certain Objective and Subjective Measures of Medical Care in Hospitals, Unpublished Master's Essay, Program in Hospital Administration, Dept. of Epidemiology and Public Health, Yale U. School of Medicine, 1963, 46 pp.

239. The Patient Record As a Source of Useful Statistics. Hosp. 29:67-71. 1955.

240. Patterns in Use of Health Services, Progress In Health Services, Vol. 15, No. 3. May-June 1966.

241. Payne, B.C., (ed.) Hospital Utilization Review Manual, Ann Arbor, The University of Michigan, 1968.

242. Payne, B.C., Use of the Criteria Approach to Measurement of Effectiveness of Hospital Utilization, J. Amer. Med. Assn., 196:1066-8. 1966. (From Proceedings of 1965 Conference on Utilization Reveiw.)

243. Payne, Rufus F., A Computer-Assisted Utilization Review Support System. Rockville, Community Health Service, 1971. 26 pp. (Pub. No. HSM 71-6500.)

244. *Payne, Rufus F., "Dynamic Record System: Collection of Data for Utilization Review," Medical Record News, XL (August 1969), pp. 45-53.

245. Perrott, G.S., Utilization of Hospital Services, Amer. J. Public Health 56:57-64, 1966.

246. Peterson, O.L., An Analytical Study of North Carolina General Practice 1953-54, Journal of Med. Ed., Dec. 1956, Vol. 31, No. 12. In Two Parts.

247. Pigman, Nathaniel M., Jr., "Multiple Regression Analysis of Factors Associated with Length of Stay in Hospitals." Paper presented at the 95th Annual Meeting of the American Public Health Association, Miami Beach, Florida, October 26, 1967. Baltimore: Division of Health Insurance Studies, Office of Research and Statistics, Social Security Administration, 1967. (Mimeographed.)

248. Podell, Lawrence. Studies in the Use of Health Services by Families on Welfare: Utilization of Preventive Health Services. The Center for the Study of Urban Problems. Graduate Div. Bernard M. Baruch College, The City U. of N.Y., New York, New York. 1969.

249. Pollack, E.S., NIMH, Estimating the Potential Demand for Staff at Fort Logan Mental Health Center. (To be Published by the Western Interstate Commission for Higher Education-WICHE.)

250. Porterfield, J.D., Perspectives on Utilization Review, J. Amer. Med. Assn., 196:1074-5. 1966. (From Proceedings of 1965 Conference on Utilization Review.)

251. Price, P.B., Taylor, Calvin W., Richards, James M., Jr., and Jacobsen, Tony L., Measurement of Physician Performance, J. Med. Educ. 39:203-211. Feb. 1964.

252. Proceedings of a Conference on Conceptual Issues in the Analysis of Medical Care Utilization Behavior. Rockville, Md., Office of Scientific and Tech. Information, National Center for Health Services Research and Dev. 1970, 95 pp.

253. "The Professional Activity Study," Inquiry, II (September 1965), pp 30-38.

254. Public Health Reports, Special Section on Medicare and Utilization Review, Vol. 83, No. 9, Sept. 1968, pp. 705.55.

255. Public Health Service, Utilization Review: A Selected Bibliography. U.S. Dept. HEW, Health Services and Mental Health Ad., 1968.

256. Querido, A., The Efficiency of Medical Care: A Critical Discussion of Measuring Procedures. H.E. Stenfert Kroese, Leiden, 1963, 288 pp.

257. Rafferty, John A., Hospital Use Patterns and Measurement in Terms of Case-Mix. N.Y.U., New York, New York, 1970.

258. The Record (Professional Activity Study – Medical Audit Program) Commission on Professional and Hospital Activities, First National Building, Ann Arbor, Michigan.

259. Reed, David A., "The Utilization and Audit Committee in Operation – An Effective Mechanism for Improving the Quality of Hospital and Medical Care," Hospital Management, XCVIII (August 1964), pp. 61-63.

260. Rein, M., Social Class and the Utilzation of Medical Care Services: A Study of British Experience under the National Health Service, Hospitals 43:43-54, July 1, 1969.

261. *"Report on the Hospital Admission and Surveillance Program (HASP). Hospital Week, Vol. 8, No. 39, September 29, 1972.

262. Retrospective Evaluation of Profiles of Hospital Utilization, CPHA (PAS/MAP) The Record, Vol. 5, No. 9, Sept. 18, 1967.

263. Review of Utilization in General Short-Term Hospitals and Projections of Future Needs, 1966. Health Facilities Planning Council, Colorado Hospital Service, 244 University Blvd., Denver, Col., 80206.

264. Rice, Dorothy P., Current Data from the Medicare Program, Public Health Reports, Vol. 83, Sept. 1968, pp. 719-730.

265. Riedel, D.C., and Fitzpatrick, T.B., Patterns of Patient Care: A Study of Hospital Use in Six Diagnoses. Research Series No. 4. Ann Arbor: The University of Michigan, Bureau of Hospital Administration, 1964.

266. Riedel, D.C., Future of Research in Utilization Review: Goals and Methods. Read before The Second National Conference on Utilization Review, Houston, 1967.

267. Riedel, D.C., Shafer, M.L., Utilization Review: A Selected Bibliography, 1933-1969. U.S. Dept. of HEW, Health Services and Mental Health Administration, Community Health Service, 1969.

268. Robinson, G.H., and Gargour, N.,"An Analysis of Hospital Patient Length of Stay." Report of work performed under USPHS Grant HM 00224-01. Berkeley: Human Factors in Technology Research Group, Institute of Engineering Research, University of California, March 30, 1964.

269. Robinson, G.H., Davis, L.E., and Leifer, R.P., Prediction of Hospital Length of Stay, Hlth, Serv. Res. 1:287-300. 1966.

270. *Robinson, Gordon H., Prediction of Hospital Length of Stay. Health Services Research 1:287-300 (Winter 1966).

271. Robinson, G.H., "Statistics on Hospital Census, Admission and Discharge Rates, and Admission Intervals." Report of work performed under USPHS Grant HM 00224-02. Berkeley: Human Factors in Technology Research Group, Institute of Engineering Research, University of California, March 2, 1964.

272. Robinson, I.E., Bronfin, Harold, Balswick, Jack O., Nursing Home Resources and Rural and Urban Needs. J. of Health and Social Behavior, Vol. 11, No. 2. June 1970, pp. 146-151.

273. *Robinson, Paul I., "Utilization and Over-Utilization of Facilities." Papers presented at the Fifteenth Annual Conference, Council on Employee Benefits, New York, October 26-27, 1961. Akron, Ohio: Council on Employee Benefits, 1961.

274. Roemer, M.I., and Anzel, Daniel M., Health Needs and Services of the Rural Poor, Medical Care Review, Vol. 25, May 1968. pp. 461-491.

275. Roemer, M.I., Hospital Utilization and the Supply of Physicians. Journal of the American Medical Assn. 178 (Dec. 9, 1961): 989-993.

276. The Role and Contribution of Epidemiology in Planning, Operation, and Evaluation of Regional Medical Programs (Heart, Cancer, and Stroke) I. Epidemiology and Regional Medical Programs, American Journal of Public Health, Vol. 58, No. 6, pp. 1047-1050, June 1968.

277. *Rosenfeld, L.S., Goldmann, F., and Kaprio, L.A., Reasons for Prolonged Hospital Stay: A Study of Need for Hospital Care, J. Chron. Dis. 6:141-52. 1957.

278. Rosenstock, Irwin M., and others, A National Study of Health Attitudes and Behavior, Ann Arbor, University of Michigan, School of Public Health, 1965.

279. Rosenstock, Irwin M., "Why People Use Health Services." Milbank Memorial Fund Quarterly, 44, no. 3, pt. 2 (July 1966).

280. Rosenthal, G., The Demand for General Hospital Facilities, Chicago, American Hospital Assoc., 1964.

281. Rossman, P.L., Bed Utilization Improved by Planned Hospital Procedures. J. Amer. Med. Assoc. 215:1483-5, March 1, 1971.

282. Roth, J.A., Utilization of the Hospital Emergency Dept., J. Health Soc. Behav. 12:312-20, Dec. 1971.

283. Rourke, A.J.J., Clear Definition of Duties Aids Utilization Committee Review, Mod. Hosp. 107:148. Oct. 1966.

284. Rumsey, J.M., Utilization Review Committees: Statement of the Problem, J. Amer. Med. Assn. 196:944-5. 1966. (From Proceedings of 1965 Conference on Utilization Review.)

285. Rusk, Howard A., Hospital Patient Survey, New York, The New York Foundation, 1956, 146 pp.

286. Rutstein, D., Screening Tests in Mass Surveys and their Use in Heart Disease Case Finding, Circulation, Vol. 4, Nov. 1951.

287. Safren, Miriam A., and Chapanis, Alphonse, A Critical Incident Study of Hospital Medication Errors, Hospitals 34(9):32-4 ff., May 1, 1960: (10):53 ff., May 16, 1960.

288. Sahai, H., and Veney, J.E., The Estimation of Inpatient Stay Parameters. Inquiry 4 (March 1967):44-57.

289. San Diego Foundation for Medical Care, 3427 Fourth Ave., San Diego, Calif., 92103, The Foundation for Medical Care, Major Review Decisions and Policies, Minimum Standards for Foundation Sponsored Plans, Criteria for Claims Review Medi-Cal/Medicare and UCR Foundation Contracts. (An Information Kit.)

290. * Schlecte, M.C., "Can 'Review Committees' Check Over Utilization?" Texas State Journal of Medicine, LVIII (November 1962), 878.

291. Schonfeld, H.K., Falk, I.S., Lavietes, P.H., Landwirth, J., and Krassner, L.S., The Development of Standards for the Audit and Planning of Medical Care: Good Pediatric Care – Program Content and Method of Estimating Needed Personnel. Amer. J. Publ. Hlth. 58:2097-110, Nov. 1968.

292. Schott, Edward C., A Study to Determine the Effect of Intra-Group Differences in Age, Sex, Length of Stay, and Religious Preference Groupings on the Importance Attributed to Selected Hospital Characteristics, University of Minnesota, Minneapolis, Minnesota, March 1970.

293. Scurletis, Theodore D., "Criteria for Utilization Review," North Carolina Medical Journal, XXX (September 1969), pp. 350-53.

294. Scutchfield, F.D., and Freeborn, D.K., Estimation of Need, Utilization and Costs of Personal Care Homes and Home Health Services, HSMHA (Health Serv. Ment. Health Admin) Health Rep. 86:372-6, April 1971.

295. Selected Bibliography on Utilization Review, Compiled by Donald C. Riedel, Ph.D., Yale University, School of Medicine, Dept. of Epidemiology and Public Health, 60 College St., New Haven, Conn., 06510, 1970.

296. Selected Institute Papers: Spotlight on Patient Discharge Planning, Developing Guidelines for Patient Discharge Planning, Pitts., Penn.: Montefiore Hospital Assoc. of Western Penn. Training and Information Center for Home Health and Related Community Services, June 1970.

297. *Shain, Max, An Epidemiological Approach to Hospital Utilization. Hosp. Mgmt. 90(4):50-1 ff., Oct. 1960.

298. Sharpe, George, A Community-Wide Approach to Utilization Review. Chronic Illness Newsletter 18(6):2-5, Dec. 1967.

299. Sheldon, A., "Toward a General Theory of Disease and Medical Care," Ch. 5 in Systems and Medical Care, A. Sheldon, F. Baker, and C.P. McLaughlin, ed., MIT Press, Cambridge, Mass., 1970.

300. Shelton, D.S., Schlesinger, R.H., and Fibiger, H.W., Bed Utilization, Phys. Therapy, 48:228-230. March 1968.

301. Shindell, Sidney, and London, Morris, A Method of Hospital Utilization Review, Pitts., U. of Pittsburgh Press, 1966, 64 pp.

302. Shindell, Sidney, Hospital Utilization-Review Mechanism. J. Amer. Med. Assoc. 196(2):144-150, April 11, 1966.

303. Shindell, Sidney, "The Use of Automated Techniques in Aiding Utilization Committees." Paper presented at the annual meeting of the State Medical Society of Wisconsin, Milwaukee, Wisconsin, May 13, 1969. Milwaukee: HSD-W, March 1969. (Mimeographed.)

304. Siegel, Doris, Pomrinse, S. David, Rehr, Helen and Gordon, Barbara, Utilization of In-Patient Services by the Elderly, The Mount Sinai Hospital, New York City, Jan. 1967 – Dec. 1967.

305. Sigmond, R.M., Controlling Hospital Use Through Medical Staff Utilization Committees. Where Is Hospital Use Headed? Proceedings of Fifth Annual Symposium on Hospital Affairs, Chicago, U. of Chicago Graduate School of Business and Health Information Foundation, pp. 73-82, 1962.

306. Sigmond, Robert M., "Hospital Effectiveness: A Complex Concept Promises Concrete Results," Hospitals, J.A.H.A., XLII (August 1, 1968), pp. 50-55.

307. Sigmond, Robert M., "An Outline of the Utilization Review System," Inquiry, III (May 1966), pp. 4-12.

308. *Sigmond, R.M., What Utilization Committees Taught Us. Modern Hospital 100 (February 1963):67-71.

309. Silver, George A., Family Medical Care: A Report on The Family Maintenance Demonstration, Cambridge, Mass., Harvard U. Press, 1963.

310. Slee, V.N., and Ament, R.P., How Much Longer Do Patients Stay in Teaching Hospitals? PAS Reporter, 6:1-6, June 10, 1968.

311. Slee, V.N., How To Carry Out Utilization Review and Meet This Requirement of Medicare, PAS Reporter, 5:1-4, Sept. 18, 1967.

312. Slee, V.N., Information Systems and Measurement Tools, J. Amer. Med. Assn., 196:1063-5. 1966. (From Proceedings of 1965 Conference of Utilization Review.)

313. Slee, V.N., Length of Stay in PAS Hospitals, U.S. 1969, Commission on Professional and Hospital Activities, 1968, Green Rd., Ann Arbor, Mich., 48105, Aug. 1970.

314. Slee, Vergil N., "The Medical Audit," Hospital Progress, XLVI (January 1965), 106-09.

315. * Slee, Vergil N., "Medical Audit Is Best Method of Meeting Utilization Review Need," The Modern Hospital, CV (December 1965), pp. 70-81, 128.

316. Slee, V.N., Medical Practice and Statistics, Ariz. Med. 14:193-201. 1957.

317. Slee, V.N., Uniform Methods of Measuring Utilization, Utilization Review: A Handbook for the Medical Staff, Chicago, American Medical Association, pp. 59-75, 1965.

318. Smith, N., Utilization and Improvement of Patient Care in Morrisania City Hospital. N.Y. St. Med. 62:263-7, Jan. 15, 1962.

319. Smith, P.R., Case Review Mechanisms, Inquiry, 2:64-9, Sept. 1965.

320. Snyder, Lillian, The Merits of Discharge Planning in Shortening the Hospitalization of Free Patients. Maryland State. Med. J. 11:10-17 (Jan. 1962).

321. Solon, Jerry A., Changing Patterns of Obtaining Medical Care in a Public Housing Community: Impact of a Service Program. Amer. J. of Public Health. Vol. 57, May 1967, pp. 772-783.

322. Solon, Jerry, A., Patterns of Medical Care: A Sociocultural Variation among a Hospital's Out-Patients. American Journal of Public Health, Vol. 56, June 1966, pp. 884-894.

323. Special Study to Evaluate Health Professions' Accreditation Systems. (N) Hosp. Manage. III:3, Jan. 1971.

324. Stamler, J., Fields, C., and Andelman, S.L., Epidemiology of Cancer of the Cervix. I. The Dimensions of the Problem: Mortality and Morbidity from Cancer of the Cervix. Amer. J. of Public Health, Vol. 57, May 1967, pp. 791-803.

325. Stegman, Anne and Baney, Anna Mae, Hospital Utilization Studies: Selected References Annotated. U.S. Dept. HEW, Public Health Service, GPO, Washington, D.C., 1962.

326. *Steiger, W.A., Yates, Louise K., Patients' Needs and Physician Role. Archives of Environmental Health, Vol. 18, May 1969, pp. 806-810. American Medical Assoc.

327. Stewart C.T., Jr., Allocation of Resources to Health, Human Resources 6:103-22, Winter 1971.

328. Study Shows Ghetto Health Clinic Reduced Hospitalization of the Poor. Mod. Hosp. 110:27, Mar. 1968.

329. Sturges, J.P., Jr., The Inpatient Discharge Statistics Program. Inquiry, 2:39-42. Sept. 1965.

330. Swartz, F.C., Identification of Nursing Home Needs, J. Amer. Med. Assn., 196:1071-2, 1966. (From Proceedings of 1965 Conference on Utilization Review.)

331. Syme, S.L., Contributions of Social Epidemiology to the Study of Medical Care Systems: The Need for Cross-Cultural Research, Med. Care 9:203-13, May-June 1971.

332. Taaffe, Gordon, "Measurement of Quality and Quantity of Medical Services," Detroit: Michigan Medical Service, 1969. (Mimeographed.)

333. Taylor, Irving A., Report of Blue Cross Plan Activity of Utilization Review and Related Responsibilities under Medicare, Chicago: Blue Cross Association, 1969.

334. Thompson, J.D., A Comprehensive Utilization and Patient Information Statistical System, Proceedings: Conference Workshop on Regional Medical Programs, National Institutes of Health, Public Health Service Publication No. 1774, U.S. Dept. HEW, Jan. 1968.

335. Tinnermon, Ed, and Borders, Blanche F., "Utilization Review: A Control Technic," Hospital Topics, XLVII (August 1969), pp. 25-29.

336. Twaddle, A.C., and Sweet, R.H., Factors Leading to Preventable Hospital Admissions. Med. Care 8:200-208, 1970.

337. Use of the Criteria Approach to Measurement of Effectiveness of Hospital Utilization. In Utilization Review: A Handbook, Chicago, American Medical Assoc., 1965, pp. 83-89.

338. * "Use of the Criteria Approach to Measurement of Effectiveness of Hospital Utilization," JAMA, CXCVI (June 20, 1966), pp. 1066-68.

339. Utilization Committees: Which Kind For Your Hospital? Med. Econ. 43:107-41. Feb. 21, 1966.

340. Utilization Review – Appendix E, State Operations Manual HIM-1 U.S. Dept. of HEW, Social Security Administration, July 1970.

341. Utilization Review Effectiveness. Bureau of Medical Care Ad., Michigan Department of Public Health, 3500 North Logan, Lansing, Michigan 48814, Aug. 1969.

342. Utilization Review: A Handbook for the Medical Staff, American Medical Assoc., Dept. of Hospitals and Medical Facilities, 535 North Dearborn Street, Chicago, Illinois, 1965, pp. 47-49.

343. *Utilization Review – Medical Care Appraisal: The HUP Way. Pittsburgh: HUP, September 1969.

344. Utilization Review Using PAS-MAP: A Compendium, CPHA, Ann Arbor.

345. *Van Dyke, F., Brown, V., and Thom, A., and others. "Long Stay" Hospital Care. New York: Columbia University, School of Public Health and Administrative Medicine, 1963, 112 pp.

346. Veney, James E., "The Computer and Hospital Information Systems: An Introduction," Inquiry, V (September 1968), 3-4.

347. Viewpoint – The Implication of Utilization Review. An Interview With Arthur E. Hess. Geriatrics, Vol. 22, Mar. 1967. pp. 82.

348. Vital and Health Statistics, National Center for Health Statistics, Public Health Service Publications No. 1000, Series 1-22, P.H. Service U.S. Dept. of HEW.

349. Vital and Health Statistics Series, Patients Discharged From Short-Stay Hospitals, U.S. Dept. of HEW, HSMHA, Washington, Dec. 1968.

350. Voluntary Regulation of Medical Care, Utilization Review: A Handbook for the Medical Staff, Chicago, Amer. Med. Assoc. 101-9. 1965.

351. Wallace, J.D., Developing an Effective Utilization Program, Hospitals, 41:70-3. Nov. 16, 1967.

352. Walter, Charles, Medicare: The Recertification Mess. Med. Economics. May 29, 1967. pp. 23-30.

353. *Weckwerth, V.E., How to Use and Misuse Average Length of Stay Data Mod. Hosp., 105:114-17, 176. Oct. 1965.

354. Weinerman, E., Richard, Patients' Perceptions of Group Medical Care: A Review and Analysis of Studies on Choice and Utilization of Prepaid Group Practice Plans. Amer. J. Publ. Hlth. 54:880-9. June 1964.

355. Weiss, J.E., Determinants of Medical Care Utilization: The Effect of Social Class and Distance on Contacts With The Medical Care System. Med. Care 8:456-62, Nov-Dec. 1970.

356. Wenkert, Walter and Terris, Milton, Methods and Findings in a Local Chronic Illness Study. Amer, J. Publ. Hlth. 50:1288-97. Sept. 1960.

357. West, Howard, "Experimentation With Regression Analysis of Length of Stay in Hospitals." Paper presented at the Annual Conference of the New York State Department of Health, Rochester, New York, June 10, 1968. Washington, D.C.: Division of Health Insurance Studies, Office of Research and Statistics, Social Security Administration, June 1968. (Mimeographed.)

358. Weygant, G.K., Teaching Patients and Hospital Use, Unpublished Master's Thesis, Hospital Administration Program, Dept. of Epidemiology and Public Health, Yale University School of Medicine, May 1969, 188 pp.

359. What Doctors Think of Medicare. U.S. News and World Report, Vol. 65, July 22, 1968. pp. 34-36.

360. *White, K.L., Andjelkovic, D., Pearson, R.J.C., et al: International Comparisons of Medical Care Utilzation. New Eng. J. Med. 277:516-522, 1967.

361. White, K.L., Improved Medical Care Statistics and the Health Services System. Public Health Rep. 82:847-854, 1967.

362. Williams, K.J., Medical Care Appraisal. Hospitals. 40(7):105-8, April 1, 1966.

363. Wilson, Harold H., "Simulated Design of a Hospital Patient Data System." Data Processing for Management Magazine. Detroit: American Data Processing, Inc., May 1963.

364. Winter, K.E., Discharge and Duration of Stay Experience in Nursing Homes. Journal of Chronic Diseases 17:863-878 (Sept. 1964.)

365. Wirick, G.C., Jr., A Multiple Equation Model of Demand for Health Care. Health Serv. Res. 1:301-346, 1966.

366. *Wolfe, Harvey," A Computerized Screening Device for Selecting Cases for Utilization Review." Paper presented at the Conference of the American Public Health Association, San Francisco, California, November 1966. Published in Management Systems and Operations Research Series, No. 3. Pittsburgh: Blue Cross of Western Pennsylvania, 1966.

367. Young, Robert Myles, "Techniques of Case Selection in a Community-Based Utilization Review Program." Unpublished Master's essay. New Haven, Connecticut: Department of Epidemiology and Public Health, Yale University School of Medicine, 1969. (Mimeographed.)

368. Zalk, M., Insurance Company's Gentle Persuasion Has Reduced Utilization, Mod. Hosp., 110:102-4, Feb. 1968.

369. Zemach, Rita, A Model of Health-Service Utilization and Resource Allocation, Operations Research, Vol. 18, No. 6, Nov-Dec, 1970. pp. 1071-1086.

370. Zimmer, J.G., An Evaluation of Observer Variability in a Hospital Bed Utilization Study, Med. Care, 5:221-33, July-August 1967.

## COST CONTROL METHODS IN HEALTH CARE DELIVERY

1. Amenta, J.S. and Luebs, H.W. "Centralized Chemistry Laboratory Serves Five Hospitals." Hospitals, J.A.H.A. 41:59 November 1, 1967.

2. American Hospital Association. Cost Finding for Hospitals. The Association. Chicago. pp. 136. 1957.

3. Bailey, Richard M., "A Comparison of Internists in Solo and Fee-for-Service Group Practice in the San Francisco Bay Area", Bulletin of the New York Academy of Medicine 44(11):1293. November 1968.

4. Barr, Robert N. and others. "Establishing Functional Relationships Among Health Care Facilities". Hospitals, J.A.H.A. 39:45-48. June 1, 1965.

5. Bates, L. "Central Laundry Planned as Base for Shared Services." Modern Hospital. 113:166. September 1969.

6. Benoit, Hector, M.D., "The Health Care Foundation of Missouri", Missouri Medicine: 596. August 1971.

7. Berman, Howard J., Weeks, Lewis E., The Financial Management of Hospitals. The Bureau of Hospital Administration, the University of Michigan, 2208 School of Public Health II. Ann Arbor, Michigan 48104. 400 pp. b. 1971.

8. Blue Cross and Blue Shield: "The Effect of Deductibles, Coinsurance and Copayment on Utilization of Health Care Services-Opinions and Impressions from Blue Cross and Blue Shield Plans", September 1971.

9. *Blue Cross Association, "Examples of Current Blue Cross Utilization Review Models That have Demonstrated Significant Savings and/or Reduction in Average Length of Stay", Chicago, February 1972.

10. Blue Cross Association, Special Issue of Inquiry: National Research and Statistics Conference Part I: Utilization Review and Control Mechanisms, Volume 2, No. 2, September 1965.

11. *Blue Cross Association, "Utilization Review and Control Activities in Blue Cross Plans", Blue Cross Reports IV:1-12, January-March 1966.

12. Brittin, G.M. and Werner, M. , Automation and Data Processing in Clinical Laboratory. C.C. Thomas. Springfield, Ohio. 1970.

13. Brown, Madison B., "Administrative Implications of Public Law 89-97", Hospitals 41:55-59, February 16, 1967.

14. Budgeting Procedures for Hospitals. American Hospital Association. 840 North Lake Shore Drive, Chicago, Illinois. 1971.

15. *"Can Prospective Reimbursement Plus Incentives Force Hospitals to Live Within Annual Budgets?", Perspective, Second Quarter, p. 1. 1971.

16. *California Dental Service*
*Professional Supervision Program*
*Cost and Quality Control*

17. Catholic Hospital Association. Guides to Hospital Administrative Planning and Control Through Accounting. The Association. St. Louis. 57 pp. 1961.

18. *Central Ohio Blue Cross; Social Security Administration*
*Cost Control*

19. *"CHAP – Certified Hospital Admission Program", Medical Care Foundation of the Sacramento County Medical Society.

20. Coldewey, George T., "Depreciation Under Medicare", Hospital Accounting 20:25-29, June 1966.

21. *Collen, M.F., Kidd, P.H., Feldman, R., and Cutler, J.L. "Cost Analysis of a Multiphasic Screening Program". New England Journal of Medicine. 280:1043-1045. 1969.

22. *Connecticut State Medical Association, Peer Review Organization; Connecticut General Life Insurance Company, Cost control, claims review*

23. *Consolidated Medical Systems, Los Angeles Cost and Quality Control*

24. Daiger, S., "Peer Review: Cost Control or Quality Control? Calif. Med. 113:75-80, December 1970.

25. Daily, E.F. et.al., "Centralized Laboratory Service Benefits Affiliated Medical Groups." Hospitals, J.A.H.A. 41:61. April 16, 1969.

26. Dalgran, T.E., "Six Hospitals Share A Central Laboratory – and Save Money." Modern Hospital. 112:92. April 1969.

27. Dame, Lawrence R., Hospital Profiles, Journal of the American Medical Association 196(12):1068-107. June 20, 1966.

28. Daring, W.P., M.D., "Developments and Accomplishments of Comprehensive Group Practice Prepayment Programs", Group Health Association of America.

29. Darley, W., "Allied Health Personnel and Their Employment for The Improvement of Medical Care." New England Journal of Medicine. 281:443. August 21, 1969.

30. Dickson, J.B. III: Automation of Clinical Laboratories. Proceedings of the I.E.E.E. 57:1974-1987. 1969.

31. Diokno, Antonio W., "Relationship Between Benefit Levels and Hospital Utilization", Hospital and Medical Economics II:1087-1116, McNerney, et. al. (ed.) 1962.

32. Donabedian, Avedis, M.D., "A Review of Some Experiences With Prepaid Group Practice", School of Public Health, the University of Michigan, Ann Arbor, Michigan, Bureau of Public Health Economics Research Series No. 12, 1969.

33. *Dowda, F.W., "Georgia Medical Care Foundation", Journal of the Medical Association, Georgia, May 1971, Volume 60.

34. *Duval County, Florida, Medical Foundation; Aetna Life and Casualty; Blue Cross of Florida Cost and Quality Control.*

35. Eilers, P.J. "The Impact of Automation on Hematology and Its Personnel." British Journal of Hematology. 13:32-35. 1967.

36. *Eisenberg, Howard, "There's a Medical Foundation in Your Future", Medical Economics:88, September 27, 1971.

37. Ensign, James M., "Third-Party Review Programs from the Blue Cross Vantage Point", JAMA CXCVI:1006-07, June 13, 1966.

38. *Falk, I.S., "Group Practice is the Pattern of the Future", The Modern Hospital 101(3):117, September 1963.

39. Faltermayer, Edmund K., "Better Care at Less Cost Without Miracles", Fortune, January 1970.

40. Fein, R., "An Economist's View. Medical Manpower – A Continuing Crisis." Journal of American Medical Association. 201:171, Sept. 11, 1967.

41. Fein, R., The Doctor Shortage: An Economic Diagnosis. Washington, D.C., The Brookings Institution. 1970.

42. Feldstein, Martin, "Hospital Cost Inflation: A Study of Nonprofit Price Dynamics", American Economic Review 56:853-872, December 1971.

43. Feldstein, Paul, "Research on the Demand for Health Services", Milbank Quarterly:128-165, July 1966.

44. Feldstein, Paul; and Severson, Ruth, "The Demand for Medical Care", in the Report of the Commission on the Cost of Medical Care 1:56-76, General Report, A.M.A., Chicago, 1964.

45. Finley, P.R., Anderson, F., and Neese, R., "Electronic Data Processing in a Private Hospital Laboratory." American Journal of Clinical Pathology. 48:575-589. 1967.

46. Fitzpatrick, Thomas B., "From the Blue Cross Perspective", Inquiry 2(2):16-29, September 1965.

47. *Florida Medical Foundation, Tampa, Florida Peer Review Effectiveness System (PRES) Cost and Quality Control*

48. Flynn, F.V., et.al. "Data Processing in Clinical Pathology." Journal of Clinical Pathology. 21:231-301. 1968.

49. Forgotson, Edward H. and Forgotson, Judith., "Innovations and Experiments in Uses of Health Manpower." Medical Care. pp. 3-14. January February 1970.

50. Ginsburg, Paul B. and Manheim, Larry, "Insurance, Copayment, and Health Services Utilization: A Critical Survey", March 1972.

51. Greenberg, Ira G. and Rodburg, Michael L., "The Role of Prepaid Group Practice in Relieving the Medical Care Crisis", The Harvard Law Review 84(4):889, February 1971.

52. Greenberg, S., "Group Practice: Blueprint for the Future", Troubled Calling, Chapter 7, New York: The Macmillan Company.

53. Griffiths, P.D. and Carter, N.W., "On-line Acquisition of the Output of AutoAnalysers." Journal of Clinical Pathology. 22:609-616. 1969.

54. *Group Health, Inc. of New York; Medicare Cost and Quality Control*

55. *Grube, Edward F., "Hospital Mergers". Hospitals. pp. 45-48. May 1, 1971.

56. *Hall, Charles, Jr., "Deductibles in Health Insurance: An Evaluation", The Journal of Risk and Insurance, pp. 253-63, June 1966.

57. Hardwick, C.P.; Myers; Barnoon; and Shuman, "The Effect of a Copay Agreement on Hospital Utilization", Research Series No. 9, Blue Cross of Western Pennsylvania, July 1971.

58. Hassard, Howard, Medical Society Review Programs, Journal of the American Medical Association 196(11):1004-1006, June 13, 1966.

59. Hay, Leon E., Budgeting and Cost Analysis for Hospital Management. Second Edition, Pressler Publications, Bloomington, Indiana, 304 pp., 1963.

60. *Heany, Charles, and Riedel, D., "From Indemnity to Full Coverage: Changes in Hospital Utilization", Blue Cross Reports, Research Series 5, October 1970.

61. Hess, Arthur E., "Medicare and Utilization Review", JAMA CXCVI: 995-98, June 13, 1966.

62. Hetherington, R.W., "The Control of Quality and Price of Medical Care Through Provision of a Preselected Panel of Private Practitioners", Med. Care 7:21-29, January-February 1969.

63. Hicks, G.P., Gieschen, M.M., Slack, W.V., and Larson, F.C., "Routine Use of a Small Digital Computer in the Clinical Laboratory". J.A.M.A. 196:973-978, 1966.

64. Hill, Charles H., and Laybourn, Hale, "North Dakota Blue Cross and Blue Shield Shared Computer Program", Inquiry V:64-69, September 1968.

65. Hinderer, Harold, "Medicare and the Crystal Ball", Hospital Accounting 20:3-4, June 1966.

66. *Hospital Service Plan of New Jersey, "Approval by Individual Diagnosis", Newark (The Plan), 1965.

67. "Hospitals vs. Medicare: Who Pays for Growth?", Hospital Practice 2:62-64, August 1967.

68. Howard, Robert, M.D., et.al., "Concepts of a State 'Foundation Plan'," The Ohio State Medical Journal:346, April 1971.

69. *Indiana Blue Cross, Cost Control*

70. *Ingram, James C., "The Case Against RCC", Hospitals 41:38-41, April 16, 1967.

71. Jaeger, John W. Jr., Hardwick, C. Patrick, "Negotiated Budget Incentive Pilot Program", Research Series, No. 7, March, 1971, Blue Cross of Western Pennsylvania, Research Department, 1 Smithfield Street, Pittsburgh, Pennsylvania 15222. Available from original publisher.

72. Jesmer, Shirley, and Scharfenberg, R.J., "Problems in Measuring the Effect of Deductibles Upon Hospital Utilization", Blue Cross Reports VI, October 1968.

73. *Johns Hopkins University, Columbia, Maryland, Health Plan, Maryland RMP, Quality Maintenance and Analysis, Fiscal Control*

74. Johnson, Everett A., "Cost Calculations Show Where Medicare Reimbursement Formula Fails", Hospitals 41:42-47, March 1, 1967.

75. . *Jonassen, James O., "Hospital Shared Services." Hospitals, pp. 43-48. January 16, 1971.

76. Kernodle, John R., "Prepayment Voluntary Insurance–Utilization and Review Committees", North Carolina Medical Journal XXIV:133, March 1963.

77. Kenney, T. D., and Melville, R. S., "Automation in Clinical Laboratories." Laboratory Inves., 16:808-810, 1967.

78. *Klarman, Herbert E., "Approaches to Moderating the Increases in Medical Care Costs", Medical Care VII(3):175, May – June 1969.

79. *Lave, Judith, et.al., "The Physician's Assistant, Exploration of the Concept-Improving Manpower Utilization", Hospitals, June 1, 1971, pp. 42-52.

80. Lee, Russell V., M.D., "Hospital Group Practice", Journal of the American Hospital Association, (Hospitals) 44:43, January 16, 1970.

81. *Leveson, Irving, "Medical Care Cost Incentives: Some Questions and Approaches for Research", Inquiry 5:3-13, December 1968.

82. *Levy, Leo, Factors Which Facilitate or Impede Transfer of Medical Functions from Physicians, to Paramedical Personnel, Journal of Health and Human Behavior, pp. 50-54.

83. Lindberg, D.A.B., The Computer and Medical Care, Thomas, Springfield, 1968.

84. Litman, T. J., A Demonstration of Reducing Hospital Costs by Sharing Services. (Minneapolis: Twin City Hospital Association), 1969.

85. *Los Angeles County Medical Association; Blue Cross of Southern California, Cost Control, Claims Review*

86. Lotharius, Joseph, "Drastic Changes Ahead in Medical Care", Illinois Medical Journal 139(1):50, January 1971.

87. Martin, Leroy, Hospital Accounting, Third Edition, Physicians Record Company, Berwyn, Illinois, 1958, 296 pp.

88. Massachusetts Blue Cross and Massachusetts Medical Society, "Proceedings of a Seminar on Health Care Utilization", November 1969.

89. Massachusetts Blue Cross, Inc., A Report on Hospital Utilization Review Committee Activity, HCR/115, Boston: Massachusetts Blue Cross, Inc., April 1969.

90. Massachusetts Blue Cross Training and Development Program: Workshops on Blue Cross and Medicare Office Procedures, Massachusetts Blue Cross, Inc., February 1970.

91. "Master Plan for Health Care Delivery, Denver, Colorado", Interhospital Education Association of Swedish and Porter Hospitals, Denver.

92. Maybee, H. V., "Blue Cross and Blue Shield Objectives within the Utilization Review System", Inquiry III:13-17, May 1966.

93. "Medicare Fee Review Today", Medical Economics, December 25, 1967, pp. 53-59.

94. Michigan Hospital Computer Automated Pilot Project, The Computer Automated Laboratory – A Preliminary Report, (mimeograph), February 14, 1969.

95. Montacute, Charles, Costing and Efficiency in Hospitals, Oxford University Press, London, 1962, 289 pp.

96. *Montgomery County, Maryland, Medical Society; Mutual of Omaha; Maryland Medicaid, Cost Control, Claims Review*

97. Mueller, Marjorie Smith; and Dwyer, Maureen, "Private Health Insurance Plans Other Than Blue Cross, Blue Shield and Insurance Company Plans", 1969, Research and Statistics Note, Note No. 27 – 1970, December 24, 1970.

98. Myers, H., "The Physician's Assistant", West Virginia Medical Journal 63:303, September 1969.

99. *MacColl, William A., M.D., "Group Practice and Prepayment of Medical Care", Public Affairs Press, Washington, D.C., 1966.

100. McNerney, W. J., et.al., "Hospital and Medical Economics – A Study of Population, Services, Costs, Methods of Payment and Controls", 2 Chicago: Hospital Research and Education Trust, 1962, 75 pp.

101. McNerney, W. J., "Coordinated Action: A Must for the Nation's Hospitals." Hospitals, 39:5:46-52, March 1, 1965.

102. National Association of Blue Shield Plans, Methods of Utilization Control, Part I: A Description of a Large Blue Shield Plan's Program, Chicago, 1963, 18 pp., and appendices.

103. *National Association of Blue Shield Plans, Utilization Review*

104. National Association of Blue Shield Plans, Utilization Review: A Program for Blue Shield Plans, Chicago: NABSP, August 1969.

105. National Society for Crippled Children and Adults., Cost Accounting, Budgeting and Statistical Procedures for Rehabilitation Centers and Facilities. The Society, Chicago, 1960, 79 pp.

106. *New York State Department of Health, Bureau of Dental Health;*
*New York Medicaid,*
*Cost and Quality Control*

107. *New York City Department of Health, Medicaid Program,*
*Cost Control*

108. Pauly, Mark V., "Efficiency, Incentives, and Reimbursement for Health Care", Inquiry VII(1):114.

109. Peacock, A. C., Bunting, S. L., Brewer, D., Cotlove, E., and Williams, G. Z., "Data Processing in Clinical Chemistry", Clinical Chemistry, 11:595-611, 1965.

110. "Peer Review, A Selection of Papers", AMA, Dept. of Health Care Financing, 1970.

111. Pendall, Rudolph J., "RCC: The Maryland Experience", Hospitals 41:41-43, April 16, 1967.

112. *Perrott, George S.,"Utilization of Hospital Services", American Journal of Public Health 56:56-64, January 1966.

113. *Physicians' Association of Clackamus County, Oregon, Cost and Quality Control*

114. Polner, Walter, "Rising Hospital Costs and Utilization Committees", The New Physician XII:343-48, September 1963.

115. Pribor, H. C., and Welkowitz, W., "Application of Computers in a Hospital Clinical Laboratory", Journal of Medical Society of New Jersey, 65:249-253, 1968.

116. *Professional Practices Committee of Queens County Medical Society, New York; Medicare Cost Control, Claims Review*

117. Rappoport, A. E., Gennaro, W. D., and Constandse, W. J., "Should the Laboratory Have Its Own Computer?", Hospital Prog. 50:114-124, 1969.

118. Richterich, R., and Ehrengruber, H., "Electronic Data Processing in the Clinical Laboratory", Minnesota Medicine, 52:69-74, 1969.

119. *Riverside County, California, Medical Association; Blue Cross of Southern California, Cost Control, Claims Review*

120. Rodde, H. R., "Shared Computer Concepts", Hospital Prog. 47:74, November 1966.

121. Rome, W. J., "A Design for Shared Services", Hospitals, J.A.H.A. 42:51, May 16, 1968.

122. Rosenberger, D. M., "Both Buyers and Sellers Benefit from Group Purchasing Efficiency", Hospitals, J.A.H.A., 41:107, January 16, 1967.

123. Rosett, Richard, and Huang, Lien-fu, "The Effect of Health Insurance on the Demand for Medical Care", forthcoming in Journal of Political Economy, 1972.

124. Roswell, Charles G., Accounting, Statistics and Business Office Procedures for Hospitals, United Hospital Fund of New York, 1946, 287 pp.

125. Russell, J. A., "Small Computers – A Bridge to Total Systems", Hospitals, 42:62-64, 1965.

126. *Santa Barbara County, California; Medical Society; Blue Cross of Southern California, Cost Control, Claims Review*

127. *Saward, Ernest W., M.D., "The Relevance of Prepaid Group Practice to the Effective Delivery of Health Services", Community Health Services, HSMHA, DHEW.

128. Scitovsky, Ann, and Snyder, Nelda M., "Effects of the Introduction of a Coinsurance Provision on Physician Utilization", Palo Alto Medical Research Foundation, January 1972.

129. Seago, W. E., "Selecting a Medicare Reimbursement Formula", Journal of Accountancy 126:31-41, August 1968.

130. Seattle Hospitals Consider Central Facilities Plan, Modern Hospital, 106:188, April 1966.

131. Seawell, Lloyd Vann, Intermediate Hospital Accounting, Indiana University, Division of Adult Education and Public Services, 1957, 427 pp.

132. Seawell, Lloyd Vann, Introduction to Hospital Accounting, Hospital Financial Management Association, 840 North Lake Shore Drive, Chicago, Illinois, 1971.

133. Seawell, Lloyd Vann, Principles of Hospital Accounting, Physicians Record Company, Berwyn, Illinois, 1960, 360 pp.

134. *Shapiro, Sam, "Comments on Approaches to Moderating the Increases in Medical Care Costs", Medical Care VIII(1):88, January – February 1970.

135. Shortliffe, "Program Organization Following Corporate Merger of Community Hospitals, Journal of the American Medical Association, September 30, 1968, pp. 109-111.

136. *Shuman, Larry J., Wolfe, Harvey, and Hardwick, C. Patrick, "Predictive Hospital Reimbursement and Evaluation Model", Inquiry 9, June 1972.

137. *Sigmond, Robert, "An Approach to Coordinated Hospital Planning", Hospital Forum, January 1961.

138. *Sioux Valley Hospital, Sioux Falls, South Dakota*
*Cost Control via physician self-regulation*

139. Skarupa, J. A., "Four Hospitals Have Food Prepared in a Central Commissary – Type Kitchen", Modern Hospital, 112:90, June 1969.

140. Smith, Paul R., Case Review Mechanisms, Inquiry 2(2):64-69, September 1965.

141. Sobota, J. T., Brewer, D., Cummings, M. E., Field, M., and Williams, G. Z., "A Data Processing System for Hematology", American Journal of Clinical Pathology, 44:502-511, 1965.

142. *"SSA's Machinery for Processing Medicare Claims", Hospitals 41:53-56, January 1, 1967.

143. Social Security Administration Memorandum: "The Impact of Cost-Sharing on the Utilization of Health Care Services", The original source is: Rucker, Don, "Deductibles and Co-Insurance with Special Reference to Government Insurance Program."

144. Specter, Gerald J., Taylor, Irving A., Andrews, Judith E., Utilization Review Casebook, Hospital Utilization Project, Pittsburgh.

145. Stead, E. A., "Conserving Costly Talents – Providing Physicians' New Assistants", JAMA 198 (10):1108-1109, December 5, 1966.

146. *Steinwald, Carolyn, "Foundations for Medical Care", Blue Cross Reports, Research Series 7, August 1971.

147. Straight, Byron W., "Reducing the Incidence of Office and Home Visits in a Medical Service Plan by Use of Coinsurance Charges", Proceedings of the Conference of Actuaries in Private Practice, XI: 73-79, 1961-62.

148. Straumfjord, J. V., Jr., Spraberry, M. N., Briggs, H. G., and Noto, T. A., "Electronic Data Processing System for Clinical Laboratories", American Journal of Clinical Pathology, 47:661-676, 1967.

149. Sunderman, F. W., Jr., "Computer Applications in Laboratory Medicine: The Delineation of Normal Values, Annual N.Y. Acad. Sci. 161:549-571, 1969.

150. Taylor, Irving A., Report of Blue Cross Plan Activity of Utilization Review and Related Responsibilities Under Medicare, Chicago: Blue Cross Association, 1969.

151. Teppel, George I., and Grothouse, Ralph H., "AHA's Cost Allocation Program – A Versitile Management Tool", Hospitals, 42:52-56, November 1, 1968.

152. *Texas Blue Cross/Blue Shield, Utilization Review*

153. Tibbitts, S. J., and Sudhalter, L., "California Hospitals Find Shared Laundry Service Pays", Modern Hospital, 109:141, November 1967.

154. *Tulsa, Oklahoma, Blue Cross, Cost Control*

155. *University of Alabama, Birmingham; HSMHA; NCHSR+D; HCTD On-Line Medicaid Claims Processing*

156. USDHEW, "Hospital Utilization Review and Medicare: A Survey", SSA, Office of R&S

157. USDHEW Reimbursement Incentives for Hospital and Medical Care: Objectives and Alternatives, Research Report No. 26, Social Security Administration, 1968.

158. *USDHEW, "Reimbursing Hospitals on Inclusive Rates", NCHSR+D, 1970.

159. *USDHEW, "Report on Regional Meetings on Payment of Reasonable Costs for Inpatient Hospital Care", 1968.

160. U.S. Department of Health, Education, and Welfare, First Annual Report on Medicare, referred to the Committee on Ways and Means, 90th Congress, 2nd Session, House Document No. 90-331, Washington: U.S. Govt. Print. Off., 1968, 101 pp.

161. "Utilization Review Training Institute", Section 3, "Interrelationship of Responsibilities", Hospital Utilization Project, Pittsburgh.

162. Vaughn, H. F., Jr., "Deductible Contract Study", Michigan Hospital Service, August 1965.

163. Walsh, David W., "Prepayment and Reimbursement", Hospitals 42:135-138, April 1, 1968.

164. Walsh, J. M., and Goldblatt, S. A., "A Punch-card Laboratory Reporting System with a Cumulative Summary Report", JAMA 297:1671-1678, 1969.

165. Weisbrod, Burton and Fisler, Robert, "Hospital Insurance and Hospital Utilization", American Economic Review, 126-32, 1961.

166. "Where the Doctors Police the Doctors", Business Week, September 4, 1971.

167. White, W., McAdam, N. K., Erickson, M. M., and Menendez, E., "Low Cost Laboratory Reporting System Uses Business Computers", Hospitals, 43:83-86, 1969.

168. White, William C., Jr., "Medicare From the Standpoint of the Carrier", Journal of the American Geriatric Society 15:984-990, November 1967.

169. Williams, G. Z., "The Use of Data Processing and Automation in Clinical Pathology", Milit. Med., 129:502-509, 1964.

170. Williams, Robert, "A Comparison of Hospital Utilization and Costs by Types of Coverage", Inquiry 3:23-42, September 1966.

171. Wolz, K. E., and Giancola, D. M., "Cooperative Laundry Will Serve Eight Hospitals in Two Cities", Hospitals, JAHA, 42:159, August 16, 1968.

172. Zalk, M., "Insurance Company's Gentle Persuasion has Reduced Utilization", Modern Hospital 110:102-104, February 1968.

## QUALITY OF CARE ASSESSMENT

1. *Altman, I., Anderson, A.J., Baker, K., Methodology in Evaluating the Quality of Medical Care: An Annotated Selected Bibliography, 1955–1968. Pittsburgh, University of Pittsburgh Press, 1969.

2. Altman, I., Clark, D.A., Kroeger, H.H., et.al., The Office Practice of Internists. I. The Feasibility of Evaluating Quality of Care. JAMA 193:371-376, 1965; II. Patient Load, JAMA 193:667-672, 1965; III. Characteristics of Patients, JAMA 193:916-922, 1965; IV. Professional Activities Other Than The Care of Private Patients, JAMA 194: 177-181, 1965; V. Background and Form of Practice of 500 Internists in New York State, JAMA 194:533-538, 1965.

3. American Medical Association, Committee on Insurance and Prepayment Plans. Guidelines For Establishing Medical Society Review Committees. Journal of the American Medical Association 194 (November 29, 1965), 1021-1022.

4. American Medical Association, Division of Medical Practice, Department of Insurance and Practice Management: Peer Review Manual, 2 vols., Chicago, 1971.

5. American Medical Association, Kit of Articles on Medical Care Appraisal, Chicago, No Date.

6. American Medical Association, Peer Review: A Selection of Papers, Chicago, 1970.

7. * American Society of Internal Medicine, Guidelines for Component Societies of Internal Medicine Regarding Initiating, Improving, and Evaluating State and Local Peer Review Mechanism, San Francisco, October 1, 1970.

8. *Anderson, A.J., Methodology in Evaluating the Quality of Medical Care: An Annotated Selected Bibliography, 1962–1968, in Donabedian, A., (ed.): Vol. II, Medical Care Appraisal: A Guide to Medical Care Administration, New York, American Public Health Association, 1969, pp. 177-221.

9. Bartlett, W., Measuring Patient Care, Med. Rec. News, 34:195-6, 22-5, 1963.

10. Beaumont, Graham, Feical, David, Magraw, Richard M., DeFoe, Edward C., Carey, James B., Medical Auditing in a Comprehensive Clinic Program, J. Med. Ed. 42(4):359-367, April 1967.

11. *Bergman, A.B., Probstfield, J.L., and Wedgwood, R.J., Performance Analysis in Pediatric Practice: Preliminary Report, J. Med. Educ., 42:249 53, 1967.

12. Bianco, Emidio, A., "The Medical Audit: Powerful Tool for Upgrading Care," Hospital Progress, July 1970, pp. 72-74.

13. Blakenhorn, M.A., Standards of Practice of Internal Medicine and Methods of Assessing the Quality of Practice in Hospitals, Ann. Intern. Med., 47:367-74, 1957.

14. Bloom, A., Glossary of Terms on Quality and Utilization Review, Rockville, HSMHA, HMO, 1967 (Unpublished).

15. Blum, J., and Fitzpatrick, R., Critical Performance Requirements for Orthopedic Surgery - Part II. Categories of Performance, Pittsburgh: American Institute for Research (prepared for Univ. of Illinois College of Med., Office of Research in Medical Education), 1965, 94 pp.

16. Blumberg, M.S. and Drew, J.A., Methods for Assessing Nursing Care Quality, Hospitals, 37:72-80, November 1, 1963.

17. Bowles, G.C., One Error per Patient Day Revealed in the Medication Study, Mod. Hosp., 109:136, August 1967.

18. Branham, D.W., The Internal Medical Audit, J. Okla. Med. Assn., 53:805-7, 1960.

19. Brinkley, S.B., Marston, R.Q., and Cavanaugh, J.H., Federal legislation, Quality in Health Care, Report of the 1968 Health Forum, U.S. Department of Health, Education, and Welfare, Public Health Service, III:27-52, 1968.

20. *Brook, R., An Audit of the Quality of Care in Social Medicine, Milb. Mem. Fed. Quart., 46:351-76, July 1968.

21. *Brook, R.H., Appel, F.A., Avery, C. et.al., Effectiveness of In-Patient Follow-Up Care, New Eng. J. Med. 285:1509-1514, 1971.

22. *Brook, R.H., Stevenson, R.L., Effectiveness of Patient Care in Emergency Room, New Eng. J. Med. 283:904-907, 1970.

23. Brown, Clement R., Jr., "Patient Care and Continuing Medical Education: Diagnosis Before Therapy," Clement R. Brown, Jr., M.D., Director of Medical Education, Chestnut Hill Hospital, Philadelphia, Pa. 19118, January 1968.

24. Butler, J.J. and Quinlan, J.W., Internal Audit in the Department of Medicine of a Community Hospital, J. Amer. Med. Assn., 167:567-72, 1958.

25. *Calder, B.H., A Quantitative Comparison of the Quality of Medical Care Practiced on a Community Medical Service and a University Medical Service in the Same Institution, unpublished Master's Essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University of Medicine, 1964, 118 pp.

26. Campion, F.L., A Report on the Project for the Evaluation of the Quality of Nursing Service, Ottawa, Canadian Nurses' Association, 1966, 92 pp.

27. *Cathcart, H.R., Evaluation of Medical Care by the Governing Board, Hospitals, 38-72-4, September 1, 1964.

28. Chatfield, G.J. and Gatehouse, G.A., Nursing Audit: An Evaluation of Nursing Care, Hospital Admin. Can., 7:34-7, May 1965.

29. Clute, K.F., The Quality of General Practice. In the General Practitioner. Toronto, Univ. of Toronto Press, 1963, Chapters 16, 17, 18.

30. Cobb, S., On the Development of Diagnostic Criteria, Arthritis Rheum., 3:91-5, 1960.

31. Colman, J.D., The Public's Concern with Quality of Medical Care, Bull. N.Y. Acad. Med., 39:306-14, 1963.

32. Colwell, A.R., and Fenn, G.K., Standards of Practice of Internal Medicine: Methods of Judging its Quality in Hospitals, Ann. Intern. Med., 51:821-32, 1959.

33. Commission for Administrative Services in Hospitals. A Quality Control Plan for Nursing Service, 1965, Los Angeles, The Commission, 1966, 33 pp.

34. Commission on Professional and Hospital Activities. Brochure for 1968: PAS, Professional Activity Study: MAP, Medical Audit Program, Medical Records at Work, Ann Arbor, Michigan, 1968, 30 pp.

35. Cowles, John T., A Critical-Comments Approach to the Rating of Medical Students' Clinical Performance, J. Med. Educ. 40(2):188-198, February 1965.

36. Daiger, S., Peer Review: Cost Control or Quality Control? Calif. Med. 113:75-80, December 1970.

37. Daily, E.F., Morehead, M.A., A Method of Evaluating and Improving the Quality of Medical Care, Amer. J. Public Health 46:848-854, 1956.

38. Davis, M., Compliance with Medical Regimens: A Panel Study, J. Health Hum. Behav. 4: 240-249 Win 63.

39. Dearing, W.P., Quality of Medical Care, Calif. Med. 98:331-5, 1963.

40. *DeGeyndt, W., Five Approaches for Assessing the Quality of Care, Hospital Administration 15:21-39, 1970.

41. *Densen, P.M., Assessment of Quality of Services in a Group Practice Prepayment Plan (Health Insurance Plan of Greater New York), Administrative Medicine, transactions of the fourth conference, New York, Josiah Macy, Jr. Foundation, 1956.

42. *Densen, P.M., "The Quality of Medical Care," Yale Journal of Biological Medicine Vol. 37, 1965, pp. 523-536.

43. Denton, J.C., Ford, A.B., Liske, R.E. and Ort, R.S., Predicting Judged Quality of Patient Care in General Hospitals, Hlth. Serv. Res., 2:26-33, Spring 1967.

44. Derley, W.D., Medicine, Money and Manpower – The Challenge to Professional Education. II. Opportunity for New Excellence, New Eng. J. Med. 276:1291-1296, 8 June 1967.

45. *deRouville, W.H., Peer Review in Biliary Tract Surgery, New York State J. Med. 71:1544-1548, 15 June 1971.

46. *Donabedian, Avedis, The Evaluation of Medical Care Programs, Bulletin of the New York Academy of Medicine 44 (February 1968), 117-124.

47. Donabedian, Avedis, An Evaluation of Prepaid Group Practice, Inquiry 6:3-27, 1969.

48. *Donabedian, Avedis, Guide to Medical Care Administration II: Medical Care Appraisal, New York, American Public Health Assn., 1969.

49. Donabedian, Avedis, "The Hospital Administrator and Assessment of the Quality of Medical Care." In Applications of Studies in Health Administration, Proceedings of the Eighth Annual Symposium on Hospital Affairs, December 1965, pp. 7-11. Graduate Program in Hospital Administration, The University of Chicago.

50. *Donabedian, Avedis, Patient Care Evaluation, Hospitals 44:131-6, 1 April 1970.

51. *Donabedian, Avedis, "Quality Control in Medical Care Programs." Paper presented at An Institute on Medical Consultation and Administration in Vocational Rehabilitation Programs. School of Public Health, the University of Michigan, Ann Arbor, May 27-29, 1963, 42 pp.

52. *Donabedian, Avedis, Quality of Care: Problems of Measurement. Some Issues in Evaluating the Quality of Nursing Care, Am. J. Public Health 59:1833-6, October 1969.

53. Drew, J., Determining Quality of Nursing Care, Amer. J. Nurs., 64:82-5, October 1964.

54. Durbin, R.L., Marcom, E.H., and Taylor, L.A., Scientific Approach to Quality Control, Hosp. Mgmt., 102:76-83, September 1966.

55. Edwards, R.M., The Quantitative Analysis of the Quality of Medical Care Practiced on a Medical Service in a Federal Short-Term General Hospital, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine, 1965, 162 pp.

56. *Ehrlich, J., Morehead, M.A., and Trussell, The Quantity, Quality and Costs of Medical and Hospital Care Secured by a Sample of Teamster Families in the New York Area. New York: Columbia University, School of Public Health and Administrative Medicine, 1962, 83 pp.

57. Eisele, C.W., Methods of Evaluating Medical Care in Hospitals, Rocky Mountain Med. J., 53:3-7, December 1957.

58. Eisele, C.W., Slee, V.N., and Hoffman, R.G., Can the Practice of Internal Medicine Be Evaluated? Intern. Med. 44:144-61, 1956.

59. Ellwood, P.M., Jr., Quantitative Measurement of Patient Care Quality, Hospitals, 40:42-5, December 1, 1966 and 59-63, December 16, 1966.

60. Elsom K: Physicians' Use of Objective Data in Clinical Diagnoses, JAMA 201:519-526, 1967.

61. Engel, G.C., The Importance of Complete and Scientific Medical Records from the Standpoint of Better Care of the Patient, Bull. Amer. Coll. Surg. 32:36-7, 1947.

62. Feinstein, A., Clinical Judgment, Baltimore: The Williams & Wilkens Co., 1967, 414 pp.

63. Ferber, S., Kaye, N., and McGee, J., Quality Control for Medicine, Med. Econ., 40:75-103, August 12, 1963.

64. *Ferrier, T.A., Appraising and Improving the Quality of Medical Care in Ambulatory Group Practice, Proceedings of the Tenth Annual Group Health Institute, Chicago, Group Health Association of America, Inc., 84-9, 1960.

65. *Fessel, W.J., Van Brunt, E.E., Assessing Quality of Care from the Medical Record, New Eng. J. Med. 286:134-138, 1972.

66. Fine, J., Study of Peer Review of In-Hospital Patient Care, N.Y. State J. Med. 71:1963-1973, 15 August 1971.

67. Fisher, P.R., The Nursing Audit, Nrs. Outlook, 5:590-2, October 1957.

68. *Flanagan, J.C., The Critical Incident Technique, Psychological Bulletin 5 (July 1954):327-358.

69. Freedman, Donald K., "Quality of Medical Care and Public Welfare Medical Programs," American Journal of Public Health and the Nation's Health, Vol. 53, June 1963, pp. 941-949.

70. Freidson, E., and Rhea, B., Knowledge and Judgment in Professional Evaluations, Admin. Sci. Quart., 10:107-24, 1965.

71. *Furstenberg, F.F., Taback, M., Goldberg, H. and Davis, J.W., Prescribing as an Index to Quality of Medical Care: A Study of the Baltimore City Medical Care Program, American Journal of Public Health 43 (October 1953), 1299-1309.

72. Garwin, R.L., Impact of Information – Handling Systems on Quality and Access to Care, Pub. Hlth. Rep., 83:346-351, May 1968.

73. Gates, E.W. and Brunetto, C.A., Have Audit, Will Improve, Mod. Hosp., 94:78-80, 144, February 1960.

74. *Goldberg, A.G., Needleman, J., Weinstein, S.L., Medical Care Evaluation Studies, A Utilization Review Requirement, JAMA Vol. 220 No. 3, pp 383-387, April 17, 1972.

75. Goldmann, F. and Graham, E.A., The Quality of Medical Care Provided at the Labor Health Institute, St. Louis, Missouri, St. Louis, The Labor Health Institute, 1954, 11 pp.

76. Gonnella, J.S., Evaluation of Patient Care, JAMA 214:2040-2043, 14 December 1970.

77. *Gottlieb, R.J., Negative Incentives for Quality Care, New Eng. J. Med. 285:526, 26 August 1971.

78. *Greenblatt, G.M., Pathology of Peer Review, JAMA 215:1823-1824, 15 March 1971.

79. Grynbaum, B.B., and Speare, E., Quality Control in an Urban Amputee Program, American Journal of Public Health 56 (August 1966), 1199-1204.

80. Hamilton, M., Measurement in Medicine, The Lancet 1 (May 10, 1958), 977-982.

81. Hawley, P.R., Evaluation of the Quality of Patient Care, Amer. J. Pub. Hlth. 45:1533-7, 1955.

82. Health Information Foundation: Physicians, Patients, and the General Hospital – Professional Judgment, Progress in Health Services 14 (4): 1-6 (Sept-Oct) 1965.

83. Health Insurance Plan of Greater New York, Professional Standards for Medical Groups and Standards for Medical Group Centers, New York, undated, 24 pp.

84. *Helbig, D.W., O'Hare, D., Smith, N.W., The Care Component Score – A New System for Evaluating Quality of Inpatient Care. American Journal of Public Health, pp. 540-546, April 1972.

85. Helfer, R.F., Estimating the Quality of Patient Care in a Pediatric Emergency Room, Journal of Medical Education 42 (March 1967), 244-248.

86. *Hetherington, R.W., Epstein, M. and Gerstel, B., The Control of Quality and Price of Medical Care Through Provision of a Preselected Panel or Private Practitioners, Med. Care, 7:21-29, January-February 1969.

87. *Hinz, C.F., Direct Observations as a Means of Teaching and Evaluating Clinical Skills, J. Med. Educ., 41:150-61, 1966.

88. Howland, D., The Development of a Methodology for the Evaluation of Patient Care, Columbus, Ohio State University, 1960, 307 pp.

89. Hubbard, John P., Levitt, Edithe J., Schumacher, Charles F., and Schnabel, Truman, An Objective Evaluation of Clinical Competence.

90. *Huntley, R.R., Steinhauser, R., White, K.L., et.al., The Quality of Medical Care: Techniques and Investigation in the Outpatient Clinic, J. Chronic Dis. 14:630-642, 1961.

91. Hutchison, G.B., Evaluation of Preventive Services, J. Chronic Dis. 11:497-508, 1960.

92. Ingegno, A.P., Quality of Care: Charts Can Help us Improve It! New Eng. J. Med. 272(25):1321-1328, June 24, 1965.

93. Issues of Regulation and Control of Health Care: Health Care Appraisal – Quality Review and Utilization Review – Summary of Options, Rockville, HSMHA, HMO, 1971 (unpublished).

94. James, George, Evaluation in Public Health Practice, Amer. J. Pub. Hlth. 52(7):1145-1154, July 1962.

95. *Jonas, S., Why Audit Quality of Medical Care? J. Nat'l. Med. Assn., 60:228-233, May 1968.

96. Jungfer, C.C. and Last, J.M., Clinical Performance in Australian General Practice, Med. Care, 2:71-83, 1964.

97. Keelty, Louisa, et.al., One Life – One Physician: An Inquiry Into the Medical Profession's Performance in Self-Regulation. A Report to the Center for Study of Responsive Law, Copyright, 1970 by the Center for Study of Responsive Law, Washington, D. C.

98. *Keiser, A. K., A Quantitative Analysis of the Quality of Medical Care Given by Two Different Medical Resident Staffs in a City Hospital, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine, 1962, 128 pp.

99. Kelman, H. R., and Willner, A., Problems in Measurement and Evaluation of Rehabilitation, Arch. Phys., Med. 43:172-81, 1962.

100. Kelman, H. R., Camerman, E., Herr, C., Perry, W., and Sward, K., Monitoring Patient Care, Med. Care, 7:1-13, January – February 1969.

101. Kerr, L. E., Prepaid Group Practice: Essential to Medical Care Quality and Economy, J.Natl.Med. Assoc. 60: 415-419, Sept. 1968.

102. Kerr, M., Trantow, D. G.: Perspectives and a Suggested Framework for Defining, Measuring and Assessing the Quality of Health Services. U.S. Dept. of Health, Education and Welfare, U.S. Public Health Service, Health Services and Mental Health Administration, 1968, pp. 33-76.

103. Kilpatrick, G.: Observer Error in Medicine, J. Med. Educ. 38(1):38-43, (January) 1963.

104. Klein, M. W., Malone, M. F., Bennis, W. G., and Berkowitz, N. H., Problems of Measuring Patient Care in the Out Patient Department, Journal of Health and Human Behavior 2 (Summer 1961):138-144.

105. Klutch, M., Medical Society Review Committees, Inquiry, 2:70-6, September, 1965.

106. Kolisch, P., de R., Quality of Care; You Can't Check It with Charts! Med. Econ., 41:80-5, October 19, 1964.

107. *Kove, M. E., A Quantitative Analysis of the Quality of Medical Care, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine, 1965, 110 pp.

108. Kroeger, Hilda, "Combined Committee Approach to Quality Patient Care", Medical Record News, April 1968.

109. *Kroeger, Hilda, et.al., "The Office Practice of Internists – The Feasibility of Evaluating Quality of Care", Journal of the American Medical Association, Volume 193, Number 5, August 2, 1965, pp. 271-376.

110. *Lambertsoen, E. C., Evaluating the Quality of Nursing Care, Hospitals, 39:61-6, November 1, 1965.

111. Last, J.: Evaluation of Medical Care, Med. J. Aust. 2:781-785, (Nov 6), 1965.

112. *Lee, R., Jones, L., The Fundamentals of Good Medical Care, Hamden, Gonn, Archon Books, 1962.

113. *Lembcke, P. A., Evolution of the Medical Audit JAMA 199: 543-550, 1967.

114. Lembcke, Paul, and Johnson, Olive G., A Medical Audit Report, Los Angeles: University of California, 1963, 291 pp.

115. *Leonard, R. C., Skipper, J. K., and Wooldridge, P. J., Small Sample Field Experiments for Evaluating Patient Care. Health Services Research 2, (Spring 1967): 46-60.

116. Lerner, M., and Riedel, D. C., The Teamster Study and the Quality of Medical Care, Inquiry 1 (January 1964): 69-80.

117. Mactavish, C. F., Sundee, J., Assessment of the Quality of Medical Care: An Annotated Bibliography, ARF Memorandum No. C-2, Minneapolis, American Rehabilitation Foundation, 1968.

118. Makover, H. B., The Quality of Medical Care, New York: Health Insurance Plan of Greater New York, July 1950 (Mimeographed).

119. Makeover, H. B., Quality of Medical Care, Methodology of Survey of Medical Groups Associated with Health Insurance Plan of New York, Am.J. Public Health 41: 824-832, July 1951.

120. *Maloney, M., Trussell, R., Elinson, J., Physicians Choose Medical Care: A Sociometric Approach to Quality Appraisal, Amer. J. Public Health 50:1678-1685, 1960.

121. McCarthy, W. H., The Stimulated Patient Management Problem: A Technique for Evaluating and Teaching Clinical Competence, Br. J. Med Educ 1: 348-352, December 1967.

122. McCleery, R. S., Keelty, L. T., Lam, M., et.al, One Life – One Physician, An Inquiry into the Medical Profession's Performance in Self-Regulation, Washington, D.C., The Center for Study of Responsive Law, 1970.

123. Medalie, J. H., Evaluation of Medical Care, Methodological Problems in a 6-Year Follow Up of a Family and Community Health Center, J. Chron. Dis. 19:27-33, January 1966.

124. Milburn, C. L., Jr., The Medical Audit in a Teaching Hospital Milit., Med., 127:938-59, 1962.

125. Monardo, G. D., The Tissue Committee – An Educational Tool, Hospitals, 29:81-4, February 1955.

126. *Morehead, M. A., Comparison Between OEO Neighborhood Health Centers and Other Health Center Providers of Ratings of the Quality of Health Care, Am. J. Public Health 61:1294-1306, July 1971.

127. *Morehead, M. A., Evaluating Quality of Medical Care in the Neighborhood Health Center Program of the OEO, Med. Care 8:118-31, March – April 1970.

128. *Morehead, M. A., "The Medical Audit as an Operational Tool", paper prepared for the Workshop on Medical Care Appraisal – Operational Aspects (November 11 and 12, 1966), New York: American Public Health Association, Program Area Committee on Medical Care Administration, Subsequently published in American Journal of Public Health 57 (September 1967): 1643-1656.

129. *Morehead, M. A., A Study of the Quality of Hospital Care Secured by a Sample of Teamster Family Members in New York City, New York, Columbia University, School of Public Health and Administrative Medicine, 1964, 98 pp.

130. Morton, J. H., An Evaluation of Blood Transfusion Practices on a Surgical Service, New England J. Med., 263:1285-7, 1960.

131. Mortrud, L. C., The Control of Professional Practice through the Medical Audit, Hospitals, 27:91-3, 180-4

132. Muller, Charlotte, "Income and the Receipt of Medical Care", American Journal of Public Health and the Nation's Health, Vol. 55, April 1965.

133. Muller, C. J., Medical Review of Prescribing, J. Chron. Dis. 18:689-696, July 1965.

134. Myers, R. S., The Audit Makes "Evaluation" Meaningful, Mod. Hosp., 87:96-108, July 1956.

135. Myers, R. S., Professional Activity Study, Mod. Hosp. 83:53-64, July 1954.

136. Myers, R. S., Quality of Patient Care – Measurable or Immeasurable, J. Med. Educ., 36:776-84, 1961.

137. Myers, R. S., Slee, V. N., and Hoffmann, R. G., Medical Audit Protects the Patient, Helps the Physician, and Serves the Hospital, Mod. Hosp., 85:77-83, September 1955.

138. O'Malley, M., and Kossack, C. F., A Statistical Study of Factors Influencing the Quality of Patient Care in Hospitals, Amer. J. Publ. Hlth., 40:1428-36, 1950.

139. *Parker, G. E., The Value of Certain Objective and Subjective Measures of Medical Care, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine. 1963, 46 pp.

140. "Patient Care Evaluation: Home Health Agencies", Focus on Utilization Review, Hospital Utilization Project, 3530 Forbes Avenue, Pittsburgh, Pennsylvania 15213.

141. *Payne, B. C., Continuous Evaluation: A System of Medical Care Appraisal, JAMA 201:536-540, August 14, 1967.

142. *Payne, B. C., "A Criteria Approach to Measurement of Quality of Medical Care and Effectiveness of Use of the Hospital", Paper prepared for the Workshop of Medical Care Appraisal – Operational Aspects (November 11 and 12, 1966), New York, American Public Health Association, Program Area Committee on Medical Care Administration, 5 pp., (Mimeographed).

143. Payne, B. C., Function of the Audit Committee in the General Hospital, Hospitals 37:62-73, 1963.

144. Payne, B. C., (ed.), Hospital Utilization Review Manual, Ann Arbor, The University of Michigan, 1968.

145. *Payne, B.C., Method of Evaluating and Improving Personal Medical Care Quality: Episode of Illness Study; for Hawaii Medical Association, Ann Arbor, University of Michigan School of Medicine, 1972.

146. Perdew, W.C., Are Your Patients Properly Cared For? A Medical Audit, or Analysis, Helps the Staff Answer This Question, Mod. Hosp., 71:84-8, July 1948.

147. *Peterson, O. L., Medical Care: Its Social and Organization Aspects – Evaluation of the Quality of Medical Care, New England, J. Med., 269:1238-45, 1963.

148. *Peterson, O. L., and Barsamian, E. M., "An Application of Logic to a Study of Quality of Surgical Care", Paper read at the Fifth IBM Medical Symposium, Endicott, New York, October 7-11, 1963.

149. Peterson, O. L., and Barsamian, E., Diagnostic Performance, in Jacquez, J.A. (ed.), The Diagnostic Process, Ann Arbor, University of Michigan, 347-66, 1964.

150. Peterson, O. L., Barsamian, E. M., and Eden, M., A Study of Diagnostic Performance: A Preliminary Report, Journal of Medical Education 41, August 1966:797-803.

151. *Peterson, O. L., et.al, An Analytical Study of North Carolina General Practice 1953-54, The Journal of Medical Education, 31, 1-165, Part 2, December 1956.

152. Peterson, Paul Q., M.D., "The Impact of Recent Federal Legislation on Personal Health Services", American Journal of Public Health and the Nation's Health, Vol. 57, July 1967, pp. 1091-93.

153. Pratt, H. N., Controlling the Quality of Medical Care in the Hospital, Trustee, 14:10-15, July 1961.

154. *Price, P. B., Measurement of Physician Performance, J. Med. Educ. 39: 203-211, February 1964.

155. Price, P., et.al., Performance Measures of Physicians, Salt Lake City, University of Utah (U.S. Dept., Health, Education, and Welfare Contract No. E-2-10-093), 1963, 198 pp.

156. Reid, C., Medical Audit Committees? We've Got a Better System, Med. Econ., 41:56-63, January 27, 1964

157. *Reidel, D. C., Utilization Review, Quality in Health Care, Report of the 1968 National Health Forum, U. S. Department of Health, Education and Welfare, Public Health Service, 1:59-64, 1968.

158. Reidel, D. C., and Shafer, M. L., Utilization Review: A Selected Bibliography, 1933-1969. U. S. Department of Health, Education, and Welfare, Health Services and Mental Health Administration, Community Health Service, 1969.

159. Reiter, F., and Kakosh, M. E., Quality of Nursing Care – A Report of a Field Study to Establish Criteria. Conducted at Division of Nursing Education, Teachers College, Columbia University, 1950-1954, Available from Graduate School of Nursing, New York Medical College, 1963, 138 pp. (processed).

160. Richardson, F. M., Peer Review of Medical Care, Med. Care 10:29-39, January – February 1972.

161. Richardson, F., MacD., Rochester Region Perinatal Study, New York J. Med. 67(9):1205-1210, May 1, 1967.

162. Rimoldi, H. J. A., Haley, J. V., and Fogliatio, H., The Test of Diagnostic Skills, Loyola Psychometric Laboratory Publication No. 25, Chicago, Loyola University, 1962, 61 pp.

163. Roberts, D., and Hudson, H., How to Study Patient Progress, Public Health Service Publication No. 1169, Public Health Service, U. S. Dept. of Health, Education and Welfare, 1964, 121 pp.

164. Roemer, M. I., Evaluation of Health Service Programs and Levels of Measurement, HSMHA Health Rep. 86:839-848, 1971.

165. Roemer, M. I., Is Surgery Safer in Larger Hospitals? Hosp. Mgmt., 87:35-7, 50, 77, 101, January 1959.

166. Rosen, E., Got Your Medical Report Card Yet? Med. Econ., 40:100-18, July 15, 1963.

167. Rosenberg, T., A Quantitative Comparison of the Quality of Medical Care Rendered to Patients on the Medical Service of Greenpoint Hospital Before and After the Affiliation with Mount Sinai Hospital, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine, 1964, 131 pp.

168. *Rosenfeld, L. S., An Assessment of Quality of Services in the Boston Metropolitan Area, Administrative Medicine, Transactions of the Fourth Conference, 1955, New York, Josiah Macy, Jr. Foundation, 151-78, 1956.

169. Rosenfeld, L. S., Quality of Medical Care in Hospitals, Amer. J. Publ. Hlth., 47:856-65, 1957.

170. Rosenthal, G., Financing and Methods of Payment for High Quality in Health Care, Quality in Health Care, Report of the 1968 National Health Forum, U. S. Department of Health, Education, and Welfare, Public Health Service, 11:163-73, 1968.

171. Rudy, J. L., Effect of Quality Control on Interlaboratory Performance, Clin. Chem., 14:583-88, 1968.

172. Safford, B. J., and Schlotfeldt, R. M., Nursing Services Staffing and Quality of Nursing Care, Nurs. Res., 9:149-54, 1960.

173. Safren, M. A., and Chapanis, A., A Critical Incident Study of Hospital Medication Errors, Hospitals, 34:32-4, 57-66, May 1, 1960, and 53, 65-8, May 16, 1960.

174. Salmon, P., Medical Care Appraisal, Hospitals, 41:127-30, April 1, 1967.

175. Sanazaro, R.J., Classification of Physician Performance in Internal Medicine, J. Med. Educ. 43:389-397, March 1968.

176. *Sanazaro, R. J., Patient Care Evaluation, Hospitals 45:131-136, April 1, 1971.

177. *Sanazaro, R. J., and Williamson, J. W., Physician Performance and its Effects on Patients, A Classification Based on Reports by Internists, Surgeons, Pediatricians and Obstetricians, Med. Care 8:299-308, 1970.

178. *Schonfeld, H. K., Falk, I. S., Lavietes, P. H., et.al., The Development of Standards for the Audit and Planning of Medical Care: Pathways among Primary Physicians and Specialists for Diagnosis and Treatment, Med. Care 6:101-114, 1968.

179. *Schonfeld, H. K., Falk, I. S., Sleeper, H. R., and Johnston, W. D., The Content of Good Dental Care: Methodology in a Formulation for Clinical Standards and Audits, and Preliminary Findings, Amer J. Publ. Hlth., 57:1137-46, July 1967.

180. *Sharpe, George, "CPHA Experience in Measuring Quality", Paper prepared for the Workshop on Medical Care Appraisal – Operation Aspects November 11 and 12, 1966, New York: American Public Health Association, Program Area Committee on Medical Care Administration, 5 pp., (Mimeographed).

181. Sharpe, George, Medical Audit: Its Purpose and Place in the Hospital, Trustee, 18:18-24, February 1965.

182. Sharpe, George, and Youngquist, Lila, "Medical Society-Sponsored Review in Montgomery County, Maryland", Public Health Reports, Vol. 83, September 1968, pp. 751-756.

183. *Sheps, C. G., A Method for Evaluating the Quality of the Office Practice of Medicine, A Feasibility Study, Pittsburgh, Graduate School of Public Health, University of Pittsburgh, 1964.

184. Sheps, M., Approaches to the Quality of Hospital Care, Public Health Rept. 70:877-886, 1955.

185. Sherman, S. R., Quality in Health Care: What is it? Quality in Health Care, Report of the 1968 National Health Forum, U. S. Department of Health, Education and Welfare, Public Health Service, 1:13-22, 1968, Vol. I - pp. 14-15, New York: APHA, 1969.

186. Siegel, B., Monitoring the Quality of Medical Care in the Health Maintenance Organizations, Rockville, HSMHA, HMO, 1971, (Unpublished).

187. Sims, N. H., Clinic Self-Evaluation Manual, The Johns Hopkins University School of Medicine, and the Health Systems Dept., Westinghouse Electric Corp., 1969.

188. Slee, V., Can the Practice of Internal Medicine be Evaluated?, Ann. Internal Med. 44:144-61, January 1956.

189. Slee, V., How to Know if You Have Quality Control, St. Louis, Mo., Catholic Hospital Association, 1971.

190. Slee, V. N., "Measuring Hospital Effectiveness: Patterns of Medical Practice", The University of Michigan Medical Center Journal, Volume 35, April – June 1969, pp. 112-115.

191. Smith, N., Utilization and Improvement of Patient Care in Morrisania City Hospital, N. Y. State J. Med., 62:263-7, 1962.

192. Somers, Herman M., and Somers, Anne R., Medicare and the Hospitals: Issues and Prospects, Washington, D. C.: The Brookings Institute, 1967, 303 pp.

193. Soricelli, D. A., Methods of Administrative Control for the Promotion of Quality in Dental Programs, Amer. J. Publ. Hlth., 58: 1723-37, September 1968.

194. Sparling, J. F., Measuring Medical Care Quality: A Comparative Study, Hospitals, 36:62-8, March 16, 1962 and 56-61, April 1, 1962.

195. Stapleton, J. F., and Zwerneman, J. A., The Influence of an Intern-resident Staff on the Quality of Private Patient Care, J. Amer. Med. Assn., 194:877-82, 904, 1965.

196. Sutton, F. F., Taking the Guesswork Out of Medical Care Evaluation Trustee, 16:1-6, October 1963.

197. Systems Development Project: On Evaluation: A Tool or a Tyranny II, No. 9-11 (22), University of Minnesota, Systems Development Project, Comment Series, Minneapolis, Minnesota Systems Research Inc., (Mimeographed – 2408 University Avenue SE, Minneapolis, Minn. 55414).

198. *Webb, S. B., Jr., A Quantitative Analysis of the Quality of Ward Medical Care Given by a House Staff, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine, 1963, 88 pp.

199. *Weed, L. I., Quality Control and the Medical Record, Arch. Intern. Med. 127:101-105, January 1971.

200. *Weinerman, E. R., Appraisal of Medical Care Programs, American Journal of Public Health 40 (September 1950): 1129-1134.

201. Weinerman, E. R., Quality Control in Group Practice Programs, Proceedings of the 11th Annual Institute, Group Health Association of America, 1961.

202. Will the Hospital Soon be Your Boss? The Stopper: Control by Your Colleagues, Med. Econ. 40:130-147, June 17, 1963.

203. *Williams, K. J., The Role of the MRL, (Medical Record Librarian) in the Appraisal of Medical Care, Hosp. Progr. 45:87-100, 1964.

204. *Williamson, J., Assessing Clinical Judgment, J. Med. Educ. 40 (2): 180-187 February 1965.

205. *Williamson, J. W., Evaluating Quality of Patient Care, JAMA 218: 564-569, October 25, 1971.

206. Williamson, J. W., Alexander, M., Miller, G. E., Continuing Education and Patient Care Research-Physician Response to Screening Test Results, JAMA 201:938-942, 1967.

207. *Williamson, J. W., Berdit, M., The Next Step: Quality Assurance Programs – Integrating Health Services Research with Continuing Medical Education, in Stearns, N., Getchell, M., and Gold, R., Continuing Medical Education in Community Hospitals, Boston, Postgraduate Medical Institute, The Massachusetts Medical Society, 1971.

208. *Williamson, J. W., Goldberg, E., Packard, M., Use of Simulated Patients in Evaluating Judgment and Affect of Telephone Counselors, in Lester, D., Brockopp, G. W., (eds.): Telephone Therapy and Crisis Intervention. Springfield, Ill., Charles C. Thomas, 1971.

209. Woodruff, I., Quality Control of Medical Care Under a Prepaid Plan, Canad. J. Publ. Hlth., 48:505-14, 1957.

210. Woodruff, I. O., A Study of the Quality of Medical Care, Administrative Medicine, Transactions of the Fourth Conference, 1955, New York, Josiah Macy, Jr. Foundation, 125-50, 1956.

211. *Yerby, A. S., Improving the Quality of Care for the Disadvantaged, Quality in Health Care, Report of the 1968 National Health Forum, U. S. Department of Health, Education and Welfare, Public Health Service, III:13-26, 1968.

212. Zabarenko, L., and Zwell, F., Bibliography – Research in General Practice, General Practice, Social Science Investigations in Medicine, Evaluation of Medical Care, Pittsburgh, Staunton Clinic, Western Psychiatric Institute and Clinic, Department of Psychiatry, School of Medicine, University of Pittsburgh, 1968, 19 pp.

# OUTCOME APPRAISAL

1. Abdellah, Faye G., and Levine, Eugene, Developing a Measure of Patient and Personnel Satisfaction with Nursing Care, Nursing Res. 5:100-8, February 1957.

2. Abdellah, Faye G., and Levine, Eugene, Effect of Nurse Staffing on Satisfactions with Nursing Care, Hospital Monograph Series No. 4 Chicago, American Hospital Association, 1958, 82 pp.

3. Abdellah, Faye G., Levine, Eugene, and Arnstein, Margaret G., Patients and Personnel Speak: A Method of Studying Patient Care in Hospitals, Public Health Service Publication No. 527, Washington.

4. *Ahmed, Paul I., Current Estimates from the Health Interview Survey – United States, July 1966-June 1967, Vital and Health Statistics, (Public Health Service Publication 1000, Series 10, No. 43 – National Center for Health Statistics), Washington: U.S. Govt. Printing Office, 1968, 51 pp.

5. *Albamarle County Virginia Experimental Medical Care Review Organization, Dr. Respiss Principal Investigator, NCHSR&D funding, Activities include outcome evaluation.

6. Alpert, Jack, Hegarty, M., Robertson, L., Kosa, J., and Haggerty, R., Effective Use of Comprehensive Pediatric Care: Utilization of Health Resources, AM J of Diseases of Children, 116:529-533, 1968.

7. Ament, Richard P., Medicare Boosts Bed Usage by Elderly, Modern Hospital, Vol. 108, February 1967, pp. 81-82.

8. Ament, Richard F., and Luttman, Roger, P.A.S. Finds the Elderly Are Staying Longer in Smaller Hospitals, Modern Hospital, Vol. 109, August 1967, pp. 106-107.

9. *American Society of Internal Medicine, ASIM Study of Evaluation of Quality Medical Care, Robert L. Hare, M.D., ASIM, San Francisco, California.

10. *Axtell, Lillian, Computing Survival Rates for Chronic Disease Patients, J.A.M.A. 186: 1125-1128, 1963.

11. Aydelotte, Myrtle Kitchell, The Use of Patient Welfare as a Criterion Measure, Nursing Res., 11:10-14, Winter, 1962.

12. Backett, M., Sumner, G., Kilpatrick, J., Dingwall-Fordyce, I., Hospitals in the Northeast Scotland Region, McLachlan, G., Problems and Progress in Medical Care, London, Oxford University Press, 1964.

13. Baumgartner, Leona, The Public Health Significance of Low Birth Weight in the U.S.A., Bull. Wld. Hlth. Org. 26(2): 175-82, 1962.

14. *Bellin, S., Geiger, H.J., Gibson, C., Impact of Ambulatory Health Care Services on the Demand for Hospital Beds, N.E.J.M. 280:808-812, 1969.

15. Bentley, Herschel P., Jr., Neonatal Mortality, J. Med. Ass. Ala. 36:377-81, Oct., 1966.

16. Bergman, A., Editor: Addressing the Effectiveness of Child Health Services, Report of the Fifty-Sixth Ross Conference on Pediatric Research, Columbus, Ohio, Ross Laboratories, 1967.

17. Berkowitz, Norman H., Malone, Mary F., Klein, Malcolm W., Eaton, Anna, Patient Follow-Through in the Outpatient Department, Nursing Res. 12:16-22, Winter 1963.

18. *Best, W.R., Automatic Auditing, Med. Rec. News. 35:53-66, 1964.

19. *Blackenhorn, M.A., Standards of Practice of Internal Medicine and Methods of Assessing the Quality of Practice in Hospitals, Ann. Intern. Med. 47:367-74, 1957.

20. Bordley, James, III, Effect of House Staff Training Programs on Patient Care, J.A.M.A. 173:1316-9, July 23, 1960.

21. *Borgatta, Edgar, Research Problems in Evaluation of Health Service Demonstrations, Milbank Memorial Fund Quarterly, Vol. 44, No. 4, October 1966, pp. 182-201.

22. Boyle, Rena E., A Study of Student Nurse Perception of Patient Attitudes, Public Health Service Publication No. 769, Washington U.S. Public Health Service, 1960, 77 pp.

23. Brant, Charles S., and Kutner, Bernard, Physician-Patient Relations in a Teaching Hospital, J. Med. Educ. 32:703-7, October 1957.

24. *Brook, R., Effectiveness of Patient Care in an Emergency Room, N. Engl. J. Med. 283:904-907, October 22, 1970.

25. *Brook, R., An Audit of the Quality of Care in Social Medicine, Milbank Memorial Fund Quarterly, 46:No. 3:351-374, 1968.

26. *Brook, R.H., Effectiveness of Inpatient Follow-Up Care, N. Engl. J. Med. 285:1509-1514, December 30, 1971.

27. Bubeck, Roy G., Jr., Matthews, James G., Riemann, Martin L., and Orth, Harvey C., Jr., Maternal Mortality: Report of Ten Year Study of Patients Under Osteopathic Care, J. Amer. Osteop. Assn. 67(12):379-395, December 1967.

28. Bundesen, Herman N., Effective Reduction of Needless Hebdomadal Deaths in Hospitals: A Long-Term Public Health Program in Chicago with Special Reference to Use of an Alerter System, J.A.M.A. 157: 1384-99, April 16, 1955.

29. Calder, B. H., A Quantitative Comparison of the Quality of Medical Care Practiced on a Community Medical Service and a University Medical Service in the Same Institution, unpublished Master's essay, Program in Hospital Administration, Department of Epidemiology and Public Health, Yale University School of Medicine, 1964, 118 pp.

30. *Cammarn, M., Computerized Records Provide Audit of Clinic Patient Care, Hospitals 42:74-79, 1968.

31. Caron, Herbert S., and Roth, Harold P., Patients' Cooperation with a Medical Regimen: Difficulties in Identifying the Noncooperator, J.A.M.A. 203:922-6, March 11, 1968.

32. *Chiang, C. L., An Index to Health: Mathematical Models, Series 2, No. 5, Vital and Health Statistics, U.S. Public Health Service, 1965, 19 pp.

33. Coe, Rodney M., et. al., The Impact of Medicare on the Utilization and Provision of Health Care Facilities: A Sociological Interpretation, Inquiry, Vol. 4, December 1967, pp. 42-46.

34. *Colwell, A. R. and Fenn, G. K., Standards of Practice of Internal Medicine: Methods of Judging its Quality in Hospitals, Ann. Intern. Med. 51: 821-32, 1959.

35. *Commission on Professional and Hospital Activities, Length of Stay in Short-Term General Hospitals (1963-64), New York, McGraw-Hill Book Company, 1966, 216 pp.

36. Commission on Professional and Hospital Activities, Patients 65 Years or Older: Days of Care, PAS Reporter, Vol. 6, August 26, 1968, pp.4.

37. *Cottrell, J. D., The Consumption of Medical Care and the Evaluation of Efficiency, Med. Care, 4:214-36, 1966.

38. Craig, W. S., Early Morbidity Among Babies Following Discharge from a Maternity Hospital, Practitioner 197:641-649, November 1966.

39. Daily, E. F. and Morehead, M. A., A Method of Evaluating and Improving the Quality of Medical Care, Amer. J. Publ. Hlth. 46:848-54, 1956.

40. *Dearing, W. P., Health Records in Management and Quality Control of Health Care Services Delivery, Presented at Panel: Health Records in an Institutional Setting, Second Annual Interdisciplinary Conference on Health Records, Washington, D. C., June 17, 1971.

41. Dearing, W. P., Quality of Medical Care, Calif. Med. 98:331-5, 1963.

42. *Decker, B. D., Hospital Utilization Study, Northeast Ohio Regional Medical Program, Health Data Series, 1970.

43. *Densen, P. M., Assessment of Quality of Services in a Group Practice Prepayment Plan (Health Insurance Plan of Greater New York), Administrative Medicine, Transactions of the Fourth Conference, 1955, New York, Josiah Macy, Jr. Foundation, 1956.

44. *Densen, P. M., Harvard Medical School, Development, Revision, and Refinement of a Patient Classification System for Use in Evaluation.

45. *Densen, P. M., The Quality of Medical Care, Yale Journal of Biological Medicine, Vol. 37, 1965, pp. 523-536.

46. *Donabedian, A., An Evaluation of Prepaid Group Practice, Inquiry 6: 3-27, 1969.

47. Donabedian, A. and Rosenfeld, L. S., Follow-up Study of Chronically Ill Patients Discharged from Hospital, Journal of Chronic Diseases 17:847-862, September 1964.

48. *Donabedian, Avedis, Evaluating the Quality of Medical Care, Milbank Memorial Fund Quarterly, 1966, Part II, Vol. 44, No. 3, July 1966, pp. 166-206.

49. *Doyle, J. C., Unnecessary Hysterectomies: Study of 6,248 Operations in Thirty-Five Hospitals during 1948, J. Amer. Med. Assn., 151:360-5, 1953.

50. Doyle, J. C., Unnecessary Ovariectomies: Study Based on Removal of 704 Normal Ovaries from 546 Patients, J. Amer. Med. Assn., 148: 1105-11, 1952.

51. Duncan, M., How to Evaluate Emergency Room Care, Mod. Hosp., 99:103-6, 168, November 1962.

52. Dwyer, Joyce M., and Lynch, William A., Nursing Responsibility for Decreasing Maternal and Perinatal Mortality and Morbidity, Hosp. Progr. 48(1):66-7, 78, January 1967.

53. Dwyer, Joyce M., and Lynch, William A., Nursing Responsibility: The Mother, The Infant, Hosp. Progr. 47(12):54-6, 112, December 1966.

54. *Ehrlich, J., Morehead, M. A., and Trussell, R. E., The Quantity, Quality and Costs of Medical and Hospital Care Secured by a Sample of Teamster Families in the New York Area, New York, Columbia University, School of Public Health and Administrative Medicine, 1962, 83 pp.

55. Eisele, C. W., Methods of Evaluating Medical Care in Hospitals, Rocky Mtn. Med. J., 53:3-7, December 1956.

56. *Eisele, C. W., The Medical Staff in the Modern Hospital, McGraw-Hill, 1967.

57. Eisele, C. W., Slee, V. N., and Hoffmann, R. G., Can the Practice of Internal Medicine be Evaluated? Ann. Intern. Med., 44:144-61, 1956.

58. Eisenberg, Leon, Landowne, Eleanor J., Wilner, Daniel M., and Imber, Stanley D, The Use of Teacher Ratings in a Mental Health Study: A Method for Measuring the Effectiveness of a Therapeutic Nursery Program, Amer. J. Publ. Hlth., 52:18-28, January 1962.

59. Ellicott, V. L., A State Program for the Development of Standards for Good Medical Care for the Aging, Amer. J. Publ. Hlth., 52:2093-9, December 1962.

60. *Ellwood, Paul M., Jr., Quantitative Measurement of Patient Care Quality: Part I – Measures of Care, Hospitals 40(23):42-5, December 1, 1966, Part 2 – A System for Identifying Meaningful Factors, Hospitals 40(24): 59-63, December 16, 1966.

61. *Epstein, B., Health Experiences of Elderly Persons in Public Housing Projects, Public Health Reports 83:34-40, 1968.

62. *Falk, I. S., Schonfeld, H. K., et.al., The Development of Standards for the Audit and Planning of Medical Care, I: Concepts, Research Design, and the Content of Primary Physician's Care, Amer. J. Publ. Hlth., 57:1118-36, 1967.

63. *Feinstein, Alvan R., Yale University School of Medicine, Improve the Methods and Data with Which Physicians Make Decisions in the Therapeutic Care of Patients.

64. Flowers, Charles E., Jr., Weinel, William H., and Kirkland, John A., Perinatal Mortality in the North Carolina Memorial Hospital, 1952-1958, J.A.M.A. 169:1037-42, March 7, 1959.

65. *Ford, A. B., Katz, S., Prognosis After Strokes, I: A Critical Review, Medicine 45:223-246, 1966.

66. Forshall, Isabella, and Rickham, P.P., Experience of a Neonatal Surgical Unit: The First Six Years, Lancet 2:751-4, October 1, 1960.

67. Freidson, Eliot, Medical Care and the Public: Case Study of a Medical Group, Ann. Amer. Acad. Pol. Soc. Sci., 346:57-66, March 1963.

68. French, C. W., An Attempt to Evaluate Some Aspects of a Community Mental Health Service, Public Health 80:121-127, 1966.

69. Garwin, Richard L., Impact of Information-Handling Systems on Quality and Access to Health Care, Publ. Hlth. Rep. 83:345-51, May 1968.

70. Gersten, Jerome W., Cenkovich, Frank, Dinken, Harold, and Miller, Barry, Evaluation of Rehabilitation in Home or Clinic Setting: Problems in Methodology, Arch. Phys. Med. 47:199-203, March 1966.

71. Gibson, Count D., and Kramer, Bernard, M., Site of Care in Medical Practice, Medical Care 3(1):14-17, January-March 1965.

72. Godfrey, Anne Elizabeth, A Study of Nursing Care Designed to Assist Hospitalized Children and Their Parents in their Separation, Nursing Res. 4(2):52-70, October 1955.

73. Green, Charles S., III, Evaluation of a Family Care Program for Released Mental Patients, Hlth. Services Res. 3:35-47, Spring 1968.

74. Grier, George S., III, and McClellan, Jason E., Effectiveness of a Large Community Coronary Care Unit, Sth. Med. J. 61:429-33, April 1968.

75. Gruenberg, E. (ed), Evaluating the Effectiveness of Mental Health Services, Milbank Mem. Fund Quarterly, 44(Pt.I):1-39, 1966.

76. *Hagner, Samuel B., LoCicero, Victor J., and Steiger, William A., Patient Outcome in a Comprehensive Medicine Clinic: Its Retrospective Assessment and Related Variables, Med. Care 6:144-56, March-April 1968.

77. *Health Services Research Study, Institute of Medicine, National Academy of Sciences, Development of Methodology for Evaluation of Neighborhood Health Centers, Health Evaluation Office, Office of the Secretary, HEW.

78. *Helfer, R., Estimating the Quality of Care in a Pediatric Emergency Room, J. Med. Education, 42:244-248, 1967.

79. Hill, F. T., The Staff Audit and the Consultation Ratio, J. Maine Med. Assn., 42:58-60, 1951.

80. Hill, F. T., The Professional Audit to Control Efficiency, J. Maine Med. Assn., 39:32-5, 1948.

81. *Hopkins, Carl E., Outcomes Conference I-II: Methodology of Identifying, Measuring and Evaluating Outcomes of Health Service Programs, Systems and Subsystems, NCHSR&D, December 1970.

82. Horvitz, David G., Methodological Considerations in Evaluating the Effectiveness of Programs and Benefits, Inquiry 2(2):96-104, September 1965.

83. Hospital Indicators, Hospitals, Vol. 42, December 16, 1968, pp. 21-23.

84. Hospital Review and Planning Council of Southern New York, Inc., Impact of Medicare on the Demand for and Financing of Health Facilities and Services in Southern New York, August 1965, 15 pp.

85. Howland, D., The Development of a Methodology for the Evaluation of Patient Care, Columbus, Ohio State University, 1960, 307 pp.

86. *Huntley, R. R., and others, The Quality of Medical Care: Techniques and Investigation in the Outpatient Clinic, Journal of Chronic Diseases, Vol. 14, 1961, pp. 630-642.

87. Hurtado, A. V., Greenlick, M. R., and Saward, E. W., The Organization and Utilization of Home Care and Extended Care Facility Services in a Prepaid Comprehensive Group Practice Plan, Medical Care 7:30-40, January-February 1969.

88. Hutchinson, C., Evaluation of Preventive Services, Journal of Chronic Diseases, Vol. 11, No. 5, May 1960, pp. 497-508.

89. Jansen, Frode, Medical Care of the Discharged Hospital Patient, New York Commonwealth Fund, 1944, 94 pp.

90. *Johnson, W., Rosenfeld, L., Indices of Performance in Ambulatory Care Services, Medical Care, 7:250-260, 1969.

91. Johnston, Robert A., Franklin, Robert, and Roffman, Larry, Is Prenatal Care Beneficial or Necessary? Sth. Med. J., 57:399-402, April 1964.

92. *Kasten, Jack, The Case for Standards in Home Care Programs, The Gerontologist, 3:14-17, March 1963.

93. *Katz, S., Heiple, K. G., Downs, T. D., et al., Long Term Course of 147 Patients with Fracture of the Hip, SGO, 124:1219-1230, 1967.

94. *Katz, Sidney, Jackson, Beverly A., Jaffee, Marjorie W., Littell, Arthur, and Turk, Charles E., Multidisciplinary Studies of Illness in Aged Persons-VI: Comparison Study of Rehabilitated and Nonrehabilitated Patients with Fracture of the Hip, J. Chron. Dis. 15:979-984, October 1962.

95. *Kelman, H., et al., Monitoring Patient Care, Medical Care, 7:1-13, 1969.

96. Kelman, Howard R., Evaluation of Rehabilitation for the Long Term Ill and Disabled Patient: Some Persistent Research Problems, J. Chron. Dis. 17:631-9, July 1964.

97. Kelman, Howard R., and Willner, Arthur, Problems in Measurement and Evaluation of Rehabilitation, Arch. Phys. Med. 43:172-81, April 1962.

98. Kidd, Cecil B., Misplacement of the Elderly in Hospital, Brit. Med. J., 11:1491-1495, December 8, 1962.

99. Kincaid, W. H., The Professional Activity Study, Inquiry, 2:30-8, September 1965.

100. * Klein, Bonnie Winters, Evaluating Outcomes of Health Services, An Annotated Bibliography, Los Angeles, University of California, 1970.

101. * Klein, M.W., M.F. Malone, W.G. Bennis and N.H. Berkowitz, Problems of Measuring Patient Care in the Out-Patient Department, Journal of Health and Human Behavior, Vol. 2, 1961, pp. 138-144.

102. Klein, Milton D., and Clahr, Jacob, Factors in the Decline of Maternal Mortality, J.A.M.A., 168:237-42, September 20, 1958.

103. Klutch, M., Medical Society Review Committees, Inquiry, 2:70-6, September 1965.

104. Kohl, Schuyler, G., Perinatal Mortality in New York City: Responsible Factors, Cambridge, Harvard University Press, 1955, 112 pp.

105. Kriesberg, Louis, and Treiman, Beatrice R., Dentists and the Practice of Dentistry as Viewed by the Public, J. Amer. Dent. Assn. 64:807-21, June 1962.

106. *Krute, Aaron, Dikoff, Newton, and Scharff, Jack, Statistical Elements of Medicare, Public Health Reports, Vol. 83, May 1968, pp. 352-358.

107. Kutner, Bernard, Modes of Treating the Chronically Ill, In Symposium of Research in Long-Term Care, Proceedings, St. Louis (Jewish Hospital of St. Louis), 1963, pp. 48-57.

108. Lambertsen, E.C., Planning and Evaluating Patient Care on Interdisciplinary Health Team, J. Ark. Med. Soc. 62:129-30, September 1965.

109. Lambertsen, Eleanor C., Evaluating the Quality of Nursing Care, Hospitals 39(21):61-6, November 1, 1965.

110. *Last, J., White, K., The Content of Medical Care in Primary Practice, Medical Care, 7:40-47, 1969.

111. *Last, J.M., The Measurement of Medical Care in General Practice, Med. J. Australia, 1:280-2, February 20, 1965.

112. *Lawton, M. Powell, Ward, Morton, and Yaffee, Silvia, Indices of Health in an Aging Population, J. of Geroni. 22(3):334-342, July 1967.

113. * Lee, J.A., Morrison, S.L., and Morris, J.N., Case Fatality in Teaching and Non-Teaching Hospitals (letter to editor), Lancet, 1:170-1, 1960.

114. Lee, J.A.H., Appendicitis in Young Women, Lancet, 2:815-17, 1961.

115. * Lee, J.A.H., Morrison, S.L., and Morris, J.N., Fatality from Three Common Surgical Conditions in Teaching and Non-Teaching Hospitals, Lancet, 2:785-90, October 19, 1957.

116. Lee, R.I. and Jones, L.W., The Fundamentals of Good Medical Care, Publication No. 22, Committee on the Costs of Medical Care, Chicago, University of Chicago Press, 1933, 302 pp.

117. *Lembcke, P.A., A Scientific Method for Medical Auditing, Hospitals, 33:65-71, June 16, 1959 and 65-6, 70-2, July 1, 1959.

118. *Lembcke, P.A., Evolution of the Medical Audit, J. Amer. Med. Assn., 199:543-50, 1967.

119. *Lembcke, P.A., Measuring the Quality of Medical Care Through Vital Statistics Based on Hospital Service Areas: 1. Comparative Study of Appendectomy Rates, Amer. J. Publ. Hlth., 42:276-86, 1952.

120. Lembcke, P.A., Medical Auditing by Scientific Methods: Illustrated by Major Female Pelvic Surgery, J. Amer. Med. Assn., 162:646-55, 1956.

121. Lembcke, P.A., Medical Auditing, J. Amer. Assn. Med. Rec. Lib., 30:324-7, 346, 1959.

122. Lembcke, P.A. and Johnson, O.G., A Medical Audit Report, Los Angeles, University of California, School of Public Health, 1963, 291 pp.

123. Leonard, Robert C., Skipper, James K., Jr., and Wooldridge, Powhatan J., Small Sample Field Experiments for Evaluating Patient Care, Hlth. Services Res., 2:46-60, Spring 1967.

124. *Levin, Arthur L., Cost Effectiveness in Maternal and Child Health: Implications for Program Planning and Evaluation, New Eng. J. Med. 278:1041-7, May 9, 1968.

125. *Lewis, C.E., Resnick, B.A., Schmidt, G., et.al., Activities, Events and Outcomes in Ambulatory Patient Care, NEJM, 280:645-649, 1969.

126. Lipworth, L., Lee, J.A.H., and Morris, J.N., Case-Fatality in Teaching and Non-Teaching Hospitals, 1956-1959, Med. Care, 1:71-6, April-June 1963.

127. *Lockward, Howard J., Lundberg, George A.F., Jr., and Odoroff, M.E., Effect of Intensive Care on Mortality Rate of Patients with Myocardial Infarcts., Publ. Hlth. Rep. 78:655-61, August 1963.

128. Lowrey, George H., The Problem of Hospital Accidents to Children, Hosp. Topics 42(8):91-4, August 1964.

129. *Mahoney, F., Barthel, D., Functional Evaluation: The Barthel Index, Maryland State J. Med., 14:61-65, 1965.

130. *Makover, H.B., The Quality of Medical Care: Methodology of Survey of the Medical Groups Associated with the Health Insurance Plan of New York, American Journal of Public Health, Vol. 41, 1951, pp. 824-832.

131. McKinnon, N.E., The Effects of Control Programs on Cancer Mortality, Canad. Med. Assoc. J. 82:1308-12, June 25, 1960.

132. *Medalie, Jack H., and Mann, Kalman J., Evaluation of Medical Care: Methodological Problems in a 6-Year Followup of a Family and Community Health Center, J. Chron. Dis. 19(1):17-33, January 1966.

133. Meltzer, Lawrence E., Coronary Units Can Help Decrease Deaths, Mod. Hospital, 104(1):102,104, January 1965.

134. Muller, Jonas N., Tobis, Jerome S., and Kelman, Howard R., The Rehabilitation Potential of Nursing Home Residents, Amer. J. Publ. Hlth. 53:243-7, February 1963.

135. *Multnomah Medical Care Review Foundation (EMCRO) – Outcome Evaluation – NCHSR&D – John Buosman.

136. Myers, R.S., Slee, V.N., and Ament, R.P., Antibiotic Study Shows Need for Therapy Audit in Hospitals, Bull. Amer. Coll. Surg., 48:61-3, 1963.

137. *Myers, R.S., A New Concept of the Medical Audit, Hospitals, 31:49-51, 112, July 1, 1957.

138. Myers, R.S., A Technique for Evaluating Professional Activities, Hosp. Progr., 38:42-4,76, August 1957.

139. Myers, R.S., Quality of Patient Care – Measurable or Immeasurable, J. Med. Educ., 36:776-84, 1961.

140. *Myers, R.S., Statistical Audits Prove Effective in Improving Medical Standards, Mod. Hosp., 103:124, November 1964.

141. Myers, R.S., The Justification for Surgery, Bull. Amer. Coll. Surg., 41:173-4, 1956.

142. *Myers, R.S. and Stephenson, G.W., Evaluation Form for Tissue Committees: Suggested Method for Tabulating Decision as to Justification for Surgery, J. Amer. Med. Assn., 156:1577-9, 1954.

143. Pakter, Jean, Erhardt, Carl I., and Jacobziner, Harold, Perinatal Mortality Rates as an Aid in Assessing Maternity Care, Amer. J. Publ. Hlth., 45:728-35, June 1955.

144. Payne, B.C., Function of the Audit Committee in the General Hospital, Hospitals, 37:62, 66-73, December 1, 1963.

145. *Payne, B.C., Use of the Criteria Approach to Measurement of Effectiveness of Hospital Utilization, J. Amer. Med. Assn., 196:1066-8, 1966, (From Proceedings of 1965 Conference on Utilization Review).

146. Payne, B.C., Use of the Criteria Approach to Measurement of Effectiveness of Hospital Utilization, Utilization Review: A Handbook for the Medical Staff, Chicago, American Medical Association, 83-100, 1965.

147. *Payne, Beverly C., Continued Evolution of a System of Medical Care Appraisal, J.A.M.A. 201:536-40, August 14, 1967.

148. Peterson, O.L. and Barsamian, E., Diagnostic Performance, in Jacquez, J.A. (ed.), The Diagnostic Process, Ann Arbor, University of Michigan, 347-66, 1964.

149. *Peterson, O.L., Medical Care: Its Social and Organizational Aspects – Evaluation of the Quality of Medical Care, New Eng. J. Med., 269:1238-45, 1963.

150. *Peterson, O.L., Andrews, L.P., Spain, R.S., and Greenberg, B.G., An Analytical Study of North Carolina General Practice, 1953-54, J. Med. Educ., 31: 1-165, December 1965 (Pt. 2).

151. Pillsbury, Stirling G., 32,465 Deliveries with Only One Mother's Death, J.A.M.A., 174:2151-2, December 24, 1960.

152. Pratt, Lois, Seligmann, Arthur, and Reader, George, Physicians' Views on the Level of Medical Information Among Patients, Amer. J. Publ. Hlth., 47:1277-83, October 1957.

153. Preuss, Hans, and Solomon, Philip, The Patient's Reaction to Bedside Teaching, New Eng. J. Med., 259:520-5, September 1958.

154. *Querido, A., The Efficiency of Medical Care, Leiden: Stenfert Kroese N.V., 1963.

155. Rae, J.W., Smith, E.W., and Lenzer, A., Results of a Rehabilitation Program for Geriatric Patients in County Hospitals, J. Amer. Med. Assoc. 180(6):463-468, May 12, 1962.

156. Ravenholt, Otto, and Jensen, Alice P., Quality Control in Maternal and Newborn Care in Topeka, Kansas, Hosp. Topics 40(11):83-7, November 1962.

157. Reader, George, Pratt, Lois, and Mudd, Margaret, What Patients Expect from Their Doctors, Mod. Hosp. 39(1):88 ff, July 1957.

158. Reinert, H.V., Effectiveness of Hospital Tissue Committee in Raising Surgical Standards, J.A.M.A. 150:992-996, November 9, 1952.

159. Rice, Charles, E., Berger, David G., Klett, Shirley,L., Sewall, Lee G., and Lemkau, Paul V., The Ward Evaluation Scale, J. Clin. Psychol. 19:251-8, April 1963.

160. Rice, Dorothy P., Current Data from the Medicare Program, Public Health Reports, Vol. 83, September 1968, pp. 719-730.

161. *Rice, Dorothy P., Estimating the Cost of Illness, Health Economic Series No. 6, Division of Medical Care Administration, HEW, 1966.

162. Rider, Rowland V., Harper, Paul A., Knobloch, Hilda, and Fetter, Sara E., An Evaluation of Standards for the Hospital Care of Premature Infants, J.A.M.A. 165:1233-6, November 9, 1957.

163. Riedel, D.C., and Fitzpatrick, T.B., Patterns of Patient Care, Ann Arbor, University of Michigan, 1964, 292 pp.

164. Ringholtz, Sharon, and Morris, Miriam, A Test of Some Assumptions About Rooming-in, Nursing Res. 10:196-9, Fall 1961.

165. Roemer, Milton I., Is Surgery Safer in Larger Hospitals?, Hosp. Mgmt. 87(1):35-7 ff., January 1959.

166. Roemer, Milton I., and Arnold, Louise M., How to Measure Patient-Centered Service, Mod. Hosp. 99(2):81-4, August 1962.

167. *Roemer, Milton I., Moustafa, A. Taher, and Hopkins, Carl E., A Proposed Hospital Quality Index: Hospital Death Rates Adjusted for Case Severity, Hlth. Services Res. 3:96-118, Summer 1968.

168. *Roemer, Milton I., The Organization of Medical Care Under Social Security Geneva International Labor Office Studies and Reports, New Series No. 73, 1969.

169. *Rosenfield, A.B., Maternal Mortality Studies in Nursing Anesthesia, Hospitals 38(4):80-93, February 16, 1964.

170. Ruppersberg, Anthony, Jr., Organization and Results of a Regional Maternal-Mortality Study, Hosp. Topics 40(9):88-91, September 1962.

171. *Sanazaro, Paul J., and Williamson, John W., End Results of Patient Care: A Provisional Classification Based on Reports by Internists, Med. Care 6:123-30, March-April 1968.

172. *Sanazaro, Paul J., The Evaluation of Medical Care Under Public Law 89-239, Med. Care 5:162-8, May-June 1967.

173. Sanders, Barkev S., Completeness and Reliability of Diagnoses in Therapeutic Practice, J. Hlth. Hum. Behav. 5:84-94, Summer-Fall 1964.

174. *Sanders, Barkev S., Measuring Community Health Levels, Amer. J. Pub. Hlth. 54(7):1063-1070, July 1964.

175. *Schulberg, Herbert C., and Baker, Frank, Program Evaluation Models and the Implementation of Research Findings, Amer. J. Publ. Hlth. 58:1240-55, July 1968.

176. *Shapiro, Sam, End-Result Measurements of Quality of Medical Care, Milbank Mem. Fd. Quart. 45(2)7-30, April 1967.

177. Shapiro, Sam, Jacobziner, Harold, Densen, Paul M., and Weiner, Louis, Further Observations on Prematurity and Perinatal Mortality in a General Population and in the Population of a Prepaid Group Practice Medical Care Plan, Amer. J. Publ. Hlth. 50:1304-17, September 1960.

178. Shapiro, Sam, Williams, Josephine J., Yerby, Alonzo S., Densen, Paul M., and Rosner, Henry, Patterns of Medical Use by the Indigent Aged Under Two Systems of Medical Care, Amer. J. Pub. Hlth., 57(5):784-790, May 1967.

179. Shapiro, Sam, Weiner, Louis, and Densen, Paul M., Comparison of Prematurity and Perinatal Mortality in a General Population and in the Population of a Prepaid Group Practice, Medical Care Plan. Amer. J. Publ. Hlth., 48:170-87, February 1958.

180. *Sheps, M.C., Approaches to the Quality of Hospital Care, Publ. Hlth. Rep. 70:877-86, 1955.

181. Sheps, M.C., Assessing Effectiveness of Programs in Operation, Transactions of the Fourth Conference, 1955, New York, Josiah Macy, Jr. Foundation, 111-24, 1956.

182. Sheps, M.C. and Sheps, C.G., Assessing the Effectiveness of Programs in Operation, Study Group Reports, Committee IV on Research, National Conference on Care of the Long-Term Patient, Baltimore, Commission on Chronic Illness, 93-104, 1954 (Processed).

183. Shyne, Ann W., LeMat, Aline F., and Kogan, Leonard S., Evaluating Public Health Nursing Service to the Maternity Patient and Her Family, Nursing Outlook, 11:56-8, January 1963.

184. *Sidel, Victor W., Evaluation of the Quality of Medical Practice, J.A.M.A., 198:763-4, November 14, 1966.

185. Smith, P.R., Case Review Mechanisms, Inquiry, 2:64-9, September 1965.

186. Snoke, A.W., Medicare Year One: A Critical Appraisal, Hospitals, Vol. 41, November 1, 1967, pp. 49-53.

187. *Somers, Herman M., and Somers, Anne R., Medicare and the Hospitals: Issues and Prospects, Washington, D.C., The Brookings Institute, 1967, 303 pp.

188. *Sparling, J. Frederick, Measuring Medical Care Quality: A Comparative Study, Hospitals 36(6):62-8, March 16, 1962; 36(7):56-61, April 1, 1962.

189. Stapleton, John F., and Zwerneman, James A., The Influence of an Intern-Resident Staff on the Quality of Private Patient Care, J. Amer. Med. Assoc. 194(8):877-882, November 22, 1965.

190. Stitt, Pauline G., Hunt, Eleanor P., Taylor, Ruth, and Goldstein, Stanley N., U.S. Ranks Eleventh in the Care of Infants, Mod. Hosp. 102(1):81-3, 160, January 1964.

191. Stone, Joseph R., Patterson, Elizabeth, and Felson, Leon, The Effectiveness of Home Care for General Hospital Patients, J.A.M.A. 205:145-8, July 15, 1968.

192. *Suchman, Edward A., Evaluative Research: Principles and Practice in Public Service and Social Action Programs, New York, Russell Sage Foundation, 1967.

193. Tayback, Matthew, and Scally, Lillian, An Evaluation of Community Nursing Services in the Care of the Mentally Ill, Amer. J. Publ. Hlth. 53:1260-8, August 1963.

194. Taylor, E. Stewart, and Walker, Louise C., Premature Infant Deaths: A Ten Year Study of Causes and Prevention, Obstet. and Gynec. 13:555-562, May 1959.

195. *Thompson, John D., Marquis, Don B., Woodward, Robert L., and Yeomans, Richard C., End-Result Measurements of the Quality of Obstetrical Care in Two U.S. Air Force Hospitals, Med. Care 6:131-43, March-April 1968.

196. *Tryon, Phyllis A., and Leonard, Robert C., A Clinical Test of Patient-Centered Nursing, J. Hlth. Hum. Behav. 7(3):183-92, Fall 1966.

197. *Vail, D.J., Strategy in Evaluating the Effectiveness of Community Mental Health Programs, Public Health Reports 76:975-978, 1961.

198. Vaughn, Betty, J. Maternal and Infant Care Project: Results in Dade County, Florida, Sth. Med. J. 61:641-5, June 1968.

199. *Weed, Lawrence L., M.D., Medical Records, Medical Education, and Patient Care, Case Western Reserve University Press, 1969.

200. *Weed, L.L., M.D., University of Vermont, Demonstrate the Feasibility of Automating the Problem-Oriented Medical Record.

201. *Weinerman, E.R., Quality Control in Group Practice Programs, Proceedings of the 11th Annual Institute, Group Health Association of America, 1961.

202. Weinerman, E. Richard, Patients' Perceptions of Group Medical Care: A Review and Analysis of Studies on Choice and Utilization of Prepaid Group Practice Plans, Amer. J. Publ. Hlth., 54:880-9, June 1964.

203. Williams, K.J., Practical Applications of the Medical Audit, Hosp. Progr., 46:109-11, January 1965.

204. Williams, K.J., The Professional Activity Study and Your Hospital, Canad. Hosp., 41:36-9, December 1964.

205. Williams, K.J., The Role of the MRL in the Appraisal of Medical Care, Hosp. Progr., 45:87-100, January 1964.

206. Williamson, John W., Assessing Clinical Judgment, J. Med. Educ. 40(2): 180-87, February 1965.

207. *Williamson, J.W., Evaluating Quality of Patient Care: A Strategy Relating Outcome and Process Assessment, J.A.M.A. 218:564-569.

208. *Williamson, John, Johns Hopkins University School of Public Health, Health Accounting System.

209. Wishik, Samuel M., and Rycheck, Russell Rule, A Formula for Comparison of Perinatal Mortality Rates in Hospitals, Amer. J. Publ. Hlth., 51:53-64, January 1961.

210. Wylie, Charles M., Participation in a Multiple Screening Clinic with Five-Year Followup, Publ. Hlth. Rep. 76:596-602, July 1961.

211. *Wylie, Charles M., Use of Death Rates in Evaluating Multiple Screening, Publ. Hlth. Rep. 76:1111-6, December 1961.

212. *Wylie, C., and White, B., A Measure of Disability, Arch Environ Health, 8:834-839, June 1964.

213. Wylie, C.M., The Future Development of Research in Public Health Departments, A Critical Review, Public Health Reports, Vol. 79, March 1964, pp. 261-265.

## DATA PROCESSING SYSTEMS FOR MEDICAL CARE APPRAISAL

1. Abrahamsson, Sixten, et.al., Danderyd Hospital Computer System. Computers and Biomedical Research 3:30-46, October 26, 1970.

2. Acheson, E.D., Ed., Record Linkage in Medicine. Edinburgh: E. & S. Livingstone, Ltd., 1968.

3. *Acheson, E.D., Medical Record Linkage. London: Oxford University Press, 1967, 213 pp.

4. Acheson, E.D., The Oxford Record Linkage Study – The First Five Years. Record Linkage in Medicine. Edinburgh: E. & S. Livingston, Ltd.:40-49, 1968.

5. Allen, S.I., Barnett, G.O., and Castleman, P.A., Use of Time-Shared General-Purpose File-Handling System in Hospital Research. Proc. IEEE 54:1641-1648, 1966.

6. *Altman, I., Methodology in Evaluating the Quality of Medical Care. An Annotated Selected Bibliography, 1955-1968, Pittsburgh: University of Pittsburgh Press, 1969, 214 pp.

7. American Medical News, The Computer in Medicine, March 1970.

8. Anticoagulant Therapy for Acute Coronary Occlusion: Survival Rates for Males. The Record 4(3), July 1, 1966.

9. Atwater, E.C., M.S., Mongan, E.S., M.D. and Jacox, R.F., M.D., Designing a Data Retrieval Program for Clinical Investigation. Journal of Chronic Disease 21:555-564, January 1969.

10. Baer, R.M., A Note on Computer Diagnosis. IEEE Transactions on Bio-Medical Engineering 11:8-12, 1964.

11. Bain, S., and Spaulding, W., The Importance of Coding Presenting Symptoms, Canad. Med. Assoc. J. 97:953-959, October 1967.

12. *Baird, H.W., and Garfunkel, J.M., Electronic Data Processing of Medical Records. New England Journal of Medicine 23, June 10, 1965.

13. Barnett, G.O., and Castleman, P.A., A Time-Sharing Computer System for Patient-Care Activities. Computers and Bio-Medical Research 1:41-51, March 1967.

14. Barnett, G.O., and Greenes, R.A., Hospital Information Systems: Interface Problem. Conf. Proc. on "Use of Data Mechanization and Computer in Medicine", Ann. New York Acad.

15. Barnett, G.O., and Hofmann, Paul B., Computer Technology and Patient Care: Experiences of a Hospital Research Effort. Inquiry 5(3):51-57, September 1968.

16. Barnett, G.O., Computers in Patient Care. New Eng. M. Med. 279:1321-1327, 1968.

17. *Barnett, G.O., Report to the Computer Research Study Section, Research Grants Review Branch, Division of Research Grants, National Institutes of Health on Computer Applications in Medical Communication and Information Retrieval Systems as Related to the Improvement of Patient Care and the Medical Record. Laboratory of Computer Science, Massachusetts General Hospital, Boston, Mass., Fall 1966, 28 pp. Typewritten.

18. Barnett, G.O., et.al., Hospital Computer Project – Memorandum Eight, Status Report 1965, Massachusetts General Hospital, Boston, Massachusetts, October 1965. (Available from University Microfilms, Ann Arbor, Michigan.)

19. Barnett, G.O., et.al., Hospital Computer Project – Memorandum Nine, Progress Report 1966, Massachusetts General Hospital, Boston, Massachusetts, February 1966. (Available from University Microfilms, Ann Arbor, Michigan.)

20. Barnett, G.O., et.al., Hospital Computer Project – Memorandum Ten, Status Report 1967, Massachusetts General Hospital, Boston, Massachusetts, October 1967. (Available from University Microfilms, Ann Arbor, Michigan.)

21. Baruch, J.J., et.al., Hospital Computer Project – Memorandum Five, Status Report, Bolt, Beranek and Newman, Cambridge, Massachusetts, December 1963.

22. Baruch, J.J., et.al., Hospital Computer Project – Memorandum Six-A, Hardware Status Report, Bolt, Beranek and Newman, Cambridge, Massachusetts, January 1965.

23. Baruch, J.J., et.al., Hospital Computer Project – Memorandum Six-E, Programming Software Status Report, Bolt, Beranek and Newman, Cambridge, Massachusetts, May 1966.

24. Berkley, C., Case Histories – Untapped Medical Information Resource. Am. J. M. Electronics (Supplement) 4:4, 1965.

25. Berkson, J., Limitations of Application of Fourfold Table Analysis to Hospital Data. Biometrics Bull. 2:47, 1946.

26. Beyan, J., and Draper, G., Sampling Problems in Studies of General Practice. Medical Care 3 3:168-169, July-September 1965.

27. *Blankenship, C.F., Data Requirements for Comprehensive Health Planning. Medical Care, Volume VIII (Supplement) 4, July-August 1970.

28. Bleich, H.L., The Computer as a Consultant. The New England Journal of Medicine 284 (3):141-147, January 21, 1971.

29. *Blue Cross Data Service, A Simplified Accumulation of Medical Data and Meaningful Reviews. Massachusetts Blue Cross, Office of Blue Cross Data Service, Boston.

30. *Blue Cross of Northeast Ohio, QUEST Manual. Blue Cross of Northeast Ohio, Cleveland, 1967.

31. Blumberg, M.S., Prospects for Automation in Handling Physicians' Medication Orders. Am. J. Hosp. Pharm. 18:567-570, September 1961.

32. Bonner, R.E., Evangelistic, C.J., Steinbeck, H.D., and Cohen, L., A Diagnostic Assistance Program. Methods Inform. Med. 50:114-128, 1966.

33. *Bonnet, P.D., Data Collection Requirements for Health Services Research. Medical Care, Volume VIII (Supplement) 4, July-August 1970.

34. *Brenner, M.H., and Weinerman, E.R., An Ambulatory Service Data System. Amer. J. Public Health 59:1154, 1969.

35. Brodman, K., and Van Woerkom, A., Computer-Aided Diagnostic Screening for 100 Common Diseases. JAMA 197 11:901-905, September 12, 1966.

36. Brodman, K., Van Woerkom, A., Erdmann, A.J., Jr., and Goldstein, L.S., Interpretation of Symptoms with Data-Processing Machine. Arch. Int. Med. 103:776-782, 1959.

37. Bruce, R.A., M.D., and Yarnall, S.R., M.D., Computer-Aided Diagnosis of Cardiovascular Disorders. Journal of Chronic Disease 19:473-484, 1966.

38. Caceres, C.A. and Abraham, S., Computer Use in Health and Medical Research – Role for Computers in Heart Disease Control, Am. J. Public Hlth. 53:582, 1963.

39. Caceres, C.A., et.al., Training and Education for Acceptance of the Computer Sciences. New York Academy of Sciences 166 3:1038-1044.

40. *Calder, B.H. and Starke, C., An Analysis of the Professional Activity Study: A Centralized Data-Processing System Providing Medical Patient, and Service Statistics to Hospitals, unpublished student project. Hospital Administration Program, Department of Epidemiology and Public Health, Yale University, School of Medicine, May 1963.

41. *California Health Data Corporation, Notes on a National Clearinghouse for Medical Record Data. San Francisco, August 13, 1970.

42. *California State Department of Public Health, Division of Patient Care Facilities and Services. Summary Report: California Health Information for Planning Service, Berkeley, California, 1968, pp. 7-14.

43. Cambridge Medical Information Systems, Inc., Automated Medical Record Locator System (Brochure), Cambridge.

44. Campbell, C.M., Akron Speeds Information System Slowly, Mod. Hosp. 104:118-122, April 1965.

45. Canadian Medical Association Journal, Computers in Medicine. Canad. Med. Assoc. J., February 22, 1969.

46. Chiang, C.L., An Index of Health: Mathematical Models. Public Health Service No. 100-Series 2-No. 5, Washington, D.C., National Center for Health Statistics, May 1965, 19 pp.

47. Christianson, L.G., Toward an Automated Hospital Information System. Ann N.Y. Acad. Sci. 161:694-706, 1969.

48. Clark, W.A., and Molnar, C.G., The LINC: Description of Laboratory Instrument Computer. Ann New York Acad. Sci. 115:653-668, 1964.

49. Clarke, B.G., Mielke, R., and Leighton, E., Urology in Hospitals of the United States and Canada, 1963 and 1964: Report of a Statistical Study. J. Urol. 96:417, 1966.

50. Collen, M.F., Development of Health Systems II. Future Goals of Engineering in Biology and Medicine, ed. Dickson, J.F. III, Brown J.H.U. New York and London, Academic Press, 1969.

51. Collen, M.F., et.al., Automated Multiphasic Screening and Diagnosis. AJPH 54 5:741-750, May 1964.

52. *Collen, J.F., General Requirements for a Medical Information System. Computers Biomed. Res. 3:393-406, 1970.

53. *Collen, M.F., Medical Information Systems; Conference Proceedings. The Permanente Medical Group, Kaiser Foundation Research Institute: Oakland, 1970, Report No. PB 195 998, 200 pp.

54. Collen, M.F., Periodic Health Examinations Using an Automated Multitest Laboratory. JAMA 195:830-833, March 7, 1966.

55. *Commission on Professional and Hospital Activities. Brochure for 1968: PAS Professional Activity Study; MAP, Medical Audit Program. Medical Records at Work. Ann Arbor, Michigan, 1968, 30 pp.

56. Commission on Professional and Hospital Activities, Computer Analysis of Length of Stay. The Record 3, 8, November 26, 1965, 12 pp.

57. Commission on Professional and Hospital Activities, Confidence Limits for Proportions or Percentages. The Record 1, 10, December 18, 1962, 13 pp.

58. Commission on Professional and Hospital Activities, Hemoglobin. Professional Activity Study, Report 36. Ann Arbor, August 25, 1959, 12 pp.

59. *Commission on Professional and Hospital Activities, Length of Stay in PAS Hospitals, United States, Regional, 1969. Ann Arbor, Michigan, 1970.

60. Commission on Professional and Hospital Activities, Length of Stay in Short Term General Hospitals (1963-1964). New York, McGraw-Hill, 1966, 216 pp.

61. Commission on Professional and Hospital Activities. Medical Records at Work. Ann Arbor, 1968, 30 pp.

62. Commission on Professional Hospital Activities, Reliability of Laboratory Determinations. Professional Activity Study, Report 37. Ann Arbor, November 10, 1959, 8 pp.

63. Commission on Professional and Hospital Activities. The Record, Ann Arbor, The Commission issues regularly.

64. *Computer Digest, Hospital/Medical Systems Innovations. Computer Digest, February 1969.

65. Computer Method for Deriving Inpatient Morbidity Statistics Based on the Person as a Unit. Brit. Med. J. 4:476, 1967.

66. *Cooney, J.R., Jr. and Converse, M.E., Patient Data Study of the American Hospital Association. Medical Care Vol. VIII (Supplement) 4, July-August 1970.

67. *Cromwell, D.F., Brown, Q.R., and Kurzenake, R.A., Selected References: Automation of the Health Care Field. Health Services and Mental Health Administration, National Center for Health Services Research and Development, Health Care Technology Program, Automation Section, Arlington, Virginia, October 1, 1968, 21 pp.,Typewritten.

68. *Curran, W.J., Stearns, B., and Kaplan, H., Legal Considerations in the Establishment of a Health Information System in Greater Boston and the State of Massachusetts. Cambridge, Joint Center for Urban Studies, 1968, p. 98.

69. Curran, W.J., Stearns, B., and Kaplan, H., Privacy, Confidentiality and Other Legal Considerations in the Establishment of a Centralized Health-Data System. New Eng. J. Med. 281:241-248, 1969.

70. Dame, L.R., Hospital Profiles. J. Amer. Med. Assoc. 196 12:1068-1071, June 20, 1966.

71. *Davis, L., Prototype for Future Computer Medical Records. Conference on MIS, San Francisco, January 1970, pp. 167-182.

72. Delp, T.J., and Kincaid, W.H., Trends in Laboratory and X-Ray Utilization. The Record 5 7: August 28, 1967.

73. *Donabedian, A., A Guide to Medical Care Administration Volume II: Medical Care Appraisal-Quality and Utilization. New York, The American Public Health Association, 1969, 221 pp.

74. Donnelly, P.R. and Kincaid, W.H., What is P.A.S. Really Like. Hosp. Progr. 42:49-52, July 1961.

75. Dorn, H.F., Some Applications of Biometry in Collection and Evaluation of Medical Data. J. Chron. Dis. 1:638, 1955.

76. Doyle, D.N., Accuracy of Selected Items of Blue Cross Claims Information. Inquiry 3:16, 1966.

77. duBoulay, G.H., The Use of a Computer in the Diagnosis of Intracranial Tumours. MCV Quarterly 4 4:114-116, 1968.

78. *Emrich, R.A. and Zak, E.J., Computer Assists in Utilization Review. Hospitals 42:56-59, August 1, 1968.

79. Engle, R.L., Jr., Medical Diagnosis: Present, Past, and Future. III. Diagnosis in Future, Including Critique on Use of Electronic Computers as Diagnostic Aids to Physician. Arch. Int. Med. 112:530-543, 1963.

80. Ensign, J.M., Third-Party Review Programs from the Blue Cross Vantage Point. J. Amer. Med. Assn. 196:1006-1007, 1966. (from Proceedings of 1965 Conference on Utilization Review)

81. Erdmann, A.J., Jr., Data Processing and Interpretation of Symptoms. I. Results. In Michigan University Biomedical Data Processing Program. The Diagnostic Process: Proceedings of a Conference . . . . held at the University of Michigan Medical School, May 9-11, 1963. Edited by J.A. Jacquez, pp. 391. Ann Arbor, Michigan, Malloy Litho, Inc., 1964, pp. 215-231.

82. Fairbairn, A.S., Comparison of Diagnosis on Successive Hospital Admissions. Record Linkage in Medicine. Edinburgh: E. & S. Livingstone, Ltd., 1968, pp. 215-225.

83. Feldman, J.D., The Dissemination of Health Information. Chicago, Aldine Publishing Co., 1966.

84. *Ferber, B., Ensign, J.M., Taylor, I.A., and Carder, H.W., Medical Care Discharge Data Collected by the Blue Cross System. Medical Care. Vol. VIII, No. 4, Supplement, July-August 1970.

85. *Ferber, B., Problems in Abstracting and Using Data from Hospital Medical Records. Inquiry 5:68-73, March 1968.

86. *Fitzmaurice, M., Sr., Lawrence, R., and Weygant, G., Implementation of a Basic Utilization Review Program. Unpublished student project, Hospital Administration Program, Department of Epidemiology and Public Health, Yale University School of Medicine, May 1968, 107 pp.

87. *Fitzpatrick, T.B., Data Collection Requirements for Hospital Management Related to the Hospital Discharge Abstract. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

88. Flagle, C., A Decision Theoretical Comparison of Three Procedures of Screening for a Single Disease. Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics & Probability, Berkeley: University of California Press, 14 pp.

89. Flagle, C.D., Use of Computers in Public Health. Hobson, W.: The Theory and Practice of Public Health 3:441-445. New York: Oxford University Press, 1969.

90. Freed, N., A Legal Structure for a National Medical Data Center. Proceedings of the American Federation of Information Processing Societies (FJCC), Vol. 33, Part I. Washington, D.C.: Thompson Book Company, 1968, pp. 387-394.

91. Fritz, W.B., Computer System Standards for a Large Organization. Datamation, February 1969.

92. Gabrielli, E.R., Prospects for Automation in the Hospital System. Ann. N.Y. Acad. Sci. 161:740-748, 1969.

93. Gabrielli, E.R., The Use of Data Mechanization and Computers in Clinical Medicine. Ann. N.Y. Acad. Sci. 161:371-830, 1969.

94. *Garwin, R.L., Impact of Information-Handling Systems on Quality and Access to Health Care. Publ. Hlth. Rep. 83:345-351, May 1968.

95. *Gay, L.G., Bibliography on Hospital Automation, 1965, 1966, 1967. American Association of Medical Record Librarians, Chicago, Illinois, August 1968. 80 pp.

96. *Goldberg, George, et. al. Inventory of Current Peer Review Activities. Rockville: Community Health Service, 1972. (Unpublished)

97. Gordon, B.L., Biomedical Language and Format for Manual and Computer Applications. Dis. of Chest. 53:38-42, 1968.

98. Gorry, G.A. and Barnett, G.O., Sequential Diagnosis by Computer. JAMA 205:849-854, 1968.

99. *Gottlieb, S.R., Data Requirements for Areawide Health Planning Agencies. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

100. Gouveia, W.A., Diamantis, C., and Barnett, G.O., Computer Applications in the Hospital Medication System. American Journal of Hospital Pharmacy, March 1969.

101. Greenes, R.A., Barnett, G.O., Klein, S.W., Robbins, A., and Prior, R.E., Recording, Retrieval and Review of Medical Data by Physician-Computer Interaction. The New England Journal of Medicine 282 6:307-315, February 5, 1970.

102. Greenes, R.A., Pappalardo, A.N. Marble, C.W., Barnett, G.O., Design and Implementation of a Clinical Data Management System. Comput. Biomed. Res. 2:469-485, 1969.

103. *Grossman, J., et. al. An Automated Medical Record Systems for a Prepaid Group Practice. Laboratory of Computer Sciences, Massachusetts General Hospital. Manuscript to be published in the Journal of the American Medical Association.

104. Grossman, J.H., Barnett, G.O., McGuire, M.T., et.al. Evaluation of Computer Acquired Patient Histories. JAMA.

105. Gruer, R., Problems of Coding Area of Residence of Patients Discharged From Hospital. (To be published)

106. Haenszel, W., and Laurie, W.I., Jr., Quality Control of Data in a Large-Scale Cancer Register Program. Methods of Information in Medicine 5 2:67-74, 1966.

107. Hall, P., Mellner, C., and Danielsson, T., J5-Data Processing System For Medical Information. Methods of Information in Medicine 6:1-6, 1967.

108. Hammon, G.L., and Jacobs, S.E., Shared Computer Systems. Hospitals, JAHA, May 1, 1970.

109. *Hampton, R.J., Feasibility Studies for a National Ambulatory Medical Survey. Report to the National Center for Health Statistics. Lea, Incorporated, Amber, Pa.

110. *Health Services Foundation. Uniform Hospital Discharge Data. Prepared for the National Center for Health Services Research and Development, Grant HS 00400, Washington, D.C. Government Printing Office, Publication No. (HSM) 72-3025, A72, 21 pp.

111. Health Information Foundation. Physicians, Patients, and the General Hospital: Patterns of Use in Massachusetts. Progress in Health Services 14:1-6. January-February, 1965.

112. *Heasman, M.A., Scottish Hospital In-Patient Statistics. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

113. *Hoermann, S.A., The National Ambulatory Medical Care Survey; Report to the Conference on Ambulatory Medical Care Records, University of Chicago Center for Continuing Education, April 18-22, 1972.

114. *Hoermann, S.A., The National Hospital Discharge Survey. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

115. *Hoffman, R.H., The Health Insurance Council's Interest in Hospital Discharge Abstracts. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

116. Hofmann, P.B., and Barnett, G.O., Time-Sharing Increases Benefits of Computer Use. Hospitals 42, June 16, 1968.

117. Hospital Physician. A First Step in Computerized Patient Care. Hospital Physician, August 1968.

118. *Hospital Research and Educational Trust. Common Data Set for Hospital Management. Prepared for the National Center for Health Services Research and Development, Contract No. HSM 110-71-37, Washington, D.C. Government Printing Office, Publication No. (HSM) 72-3026, 1972, 45 pp.

119. Hubbard, M.R., Computer Systems for Medical Record Linkage. B.Sc. Thesis, Magdalen College, University of Oxford, 1969.

120. Jack, W.W., Slee, V.N., and Headly, P.D., Gynecological Surgery: Its Profile. Amer. J. Obstet. Gynec. 89:186, 1964.

121. Jacobus, G.C., Sorting Sense from Nonsense in Hospital ADP Programs. Hospitals 41:32-36, May 1, 1967.

122. Jang, R., and Barker, K., Punch Cards, Teletype Help to Automate Drug System. Mod. Hosp. 104:124-130, April 1965.

123. Johnson, O.G., Record and Report Systems Development for Local Health Departments: Part I. Public Health Nursing Administrative Statistics – Packaged Computer Programs: Part II. Environmental Health Administrative Statistics – Packaged Computer Programs. School of Public Health, University of California at Los Angeles, 1970, 270 pp. Report No. HSRD 71-32.

124. Jydstrup, R.A., and Gross, M.J., Cost of Information Handling in Hospitals. Health Serv. Research 1:235-271, Winter, 1966.

125. *Kennedy, F., et.al. Switch: A System Producing a Full Hospital Case History on Computer. The Lancet, December 7, 1968.

126. Kennedy, J.M., The Use of a Digital Computer for Record Linkage. The Use of Vital and Health Statistics for Genetic and Radiation Studies, United Nations, New York, 1962, pp. 155-160.

127. Kiely, J.M., Juergens, J.L., Hisey, B.L., and Williams, P.E., A Computer-Based Medical Record. Entry of Data from the History and Physical Examinations by the Physician. JAMA 205:571-576, 1968.

128. Kincaid, W.H. and Bhatia, M., Length of Stay: Friday and Saturday Admissions. PAS Reporter 5:1-2, July 24, 1967.

129. Kincaid, W.H. and Chaldekas, K.S., Acute Coronary Occlusion: Median Stay. PAS Reporter 5:1-2, June 30, 1967.

130. Kincaid, W.H. and McNeil, N.L., Hysterectomy: Age of Patients. PAS Reporter 5:1-2, June 23, 1967.

131. Kincaid, W.H., Cholecystectomy: Preoperative and Total Stay. PAS Reporter 6:1-2, July 29, 1968.

132. Kincaid, W.H., The Internal Medical Audit: How Can the Medical Record Librarian Help? Hosp. Progr. 43:92-93, 110, April 1962.

133. *Kincaid, W.H., The Professional Activity Study. Inquiry 2:30-38, September 1965.

134. Klein, M.W., Malone, M.F., Bennis, W.G. and Berkowitz, N.H., Problems of Measuring Patient Care in the Out-Patient Department. J. Hlth. Hum. Behav. 2:138-144, 1961.

135. *Kolouch, F.T., Computer Shows How Patient Stays Vary. Mod. Hosp. 105:103-104, November 1965.

136. Korein, J., Bender, A.L., Rothenberg, D., and Tick, L.J., Computer Processing of Medical Data by Variable-Field-Length Format. III. Statistical Analysis of Narrative Content. JAMA 196:957-963, 1966.

137. Korein, J., Tick, L.J., Woodbury, M.A., Cady, L.D., Goodgold, A.L., and Randt, C.T., Computer Processing of Medical Data by Variable-Field-Length Format. JAMA 196:132-138, 1963.

138. Kouchoukos, N.T., et.al. Automated Patient Care Following Cardiac Surgery. From the Department of Surgery, School of Medicine and the Medical Center, University of Alabama in Birmingham, 1971.

139. Kraus, A.S., Use of Hospital Data in Studying Association Between Characteristic and Disease. Pub. Health Rev. 69:1211, 1954.

140. *Last, J.M., Data Collection Requirements for Patient Management. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

141. Last, J., Primary Medical Care: 1. Record Keeping. Milbank Mem. Fund. Quart. XLIII 2:266-276, April 1965.

142. Lea Associates, Inc. National Disease and Therapeutic Index. Ambler, Pennsylvania, Lea & Associates, Inc., (quarterly). (A series of reports from an ongoing study of the content of medical practice to provide facts about private medical practice on a continuing basis for the use of supporting pharmaceutical firms and interested medical educators, investigators and practitioners.)

143. Ledley, Robert S., Practical Problems in the Use of Computers in Medical Diagnosis. Proceedings of the IEEE, Vol. 57, No. 11, November 1969.

144. Ledley, R.S., Use of Computers in Biology and Medicine. New York: McGraw-Hill Book Co., 1965.

145. Levy, R.P., Cammarn, M.R., and Smith, M.J., Computer Handling of Ambulatory Clinic Records. JAMA 190:1033-1037.

146. *Leighton, E. and Headly, P., Computer Analysis of Length of Stay. Hospital Progress 49:67-70, April 1968.

147. *Leighton, E., California's Computerized Information System for Hospitals. Hospital Forum. May 1970, pp. 6-8.

148. *Leighton, E., MR1 – The Medical Record System of the California Health Data Corporation. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

149. Length of Stay in PAS Hospitals, United States, Pre- and Post-Medicare. Commission on Professional and Hospital Activities. Ann Arbor: CPHA, 1969.

150. Lew, I., Day of the Week and Other Variables Affecting Hospital Admissions, Discharges, and Length of Stay for Patients in the Pittsburgh Area. Inquiry 3:3-39, February 1966.

151. Lewis, P.M., Medicare's Effects on Medical Care: The Hospital Utilization Project of Pennsylvania. Publ. Hlth. Rep. 83:743-750. September 1968.

152. *Lewis, P.M., The Hospital Utilization Project – A Management Resource. Address presented at the 70th Annual Meeting of the American Hospital Association in Atlantic City, N.J., September 17, 1968.

153. *Lewis, P.M., The Hospital Utilization Project of Pennsylvania. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

154. Lindberg, D.A.B., The Computer and Medical Care. Springfield, Illinois, Chas. C. Thomas, 1968.

155. Lockheed Missiles and Space Company, Medical Information Systems. Technical Report: Analysis of Information Needs of Nursing Stations. (PH110-68-47) Sunnyvale, California, May 1967, 397 pp.

156. *Lubin, J.W., The CHIPS Demonstration Project. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

157. *Lusted, L.B. and Coffin, R.W., PRIME: An Operational Model for a Hospital Automated Information System. Proc. IEEE 57:1961-1973, 1969.

158. Lusted, L.B., M.D., Decision-Making Studies in Patient Management. The New England Journal of Medicine, February 25, 1971.

159. Madden, E.E., Jr., and Dreyfus, R.H., Outpatient Pharmacy Prescription Automation. Am. J. Hosp. Pharm. 25:20, January 1968.

160. *Mannix, J.R., The QUEST Program of Northeast Ohio. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

161. *Massachusetts Blue Cross, Inc. 44 Most Frequent Diagnoses, 1966 Patient Profiles. Boston, January 1968.

162. Massachusetts Blue Cross, Inc., Office of Research. 1965 Patient Profiles – Average Stay, 44 Most Frequent Diagnoses. Boston: The Office, October 1967, 48 pp.

163. *Massachusetts General Hospital, and Harvard Medical School. Laboratory of Computer Science Handbook. Boston, 1972.

164. *Massachusetts Hospital Association, Utilization Information Service Manual, Burlington, Mass., 1971.

165. Mayne, J.G., et.al., A Health Questionnaire Based on Paper-and-Pencil Medium Individualized and Produced by Computer. JAMA 208 (11); June 16, 1969.

166. Mayne, J.G., The Computer and Its Potential for Medicine. Annals of Internal Medicine 70 (1), January 1969.

167. Mayne, J.G., Weksel, W., and Sholtz, P.N., Toward Automating the Medical History. Mayo Clin. Proc. 43:1-24, January 1968.

168. McClenahan, Everett. Hospital Utilization Reviews. J. Amer. Med. Assoc. 196 11:99-104, June 13, 1966.

169. McCreight, W.R., The Real Time Revolution in Medicine. The Computer Bulletin, May 1968.

170. McLachlan, G. (ed). Operational Research in the Health Services, A Symposium. London: Nuffield Provincial Hospital Trust, Oxford University Press, 1962.

171. McLachlan, G., Shegog, R. (eds). Computers in the Service of Medicine: Essays on Current Research and Applications. London, Nuffield Provincial Hospital Trust, Oxford University Press, 1962.

172. Medical Research Council of Canada. Health Research Uses of Record Linkage in Canada. MRC Report No. 3, Ottawa, 1968.

173. *Medicare: Analysis of Days of Care – Methodology. U.S. Department of Health, Education, and Welfare, Social Security Administration, Office of Research and Statistics, September 1970.

174. *Michael, J.M., et.al., A Basic Information System for Health Planning. Public Health Reports 83 1:21-28, January 1968.

175. Minckler, T.M., Ausman, R.K., Graham, T., Newell, G.R., and Levine, P.H., HUMARIS – An Automated Medical Data Management System. Method. Inform. 6:65-69, 1967.

176. Mindlin, A., Confidentiality and Local Information Systems. Public Admin. Rev. November-December 1968; p. 514.

177. Montgomery, R.L., and Singman, D., Multiphasic Screening. Hospitals 44:71-74, March 1970.

178. Moore, F.J., Mechanizing a Large Register of First Order Patient Data. Meth. Med. Inform. 4:1-10, 1965.

179. *Morisse, R., The Development of a Basic Utilization Review Program. Unpublished Master's Thesis, Hospital Administration Program, Department of Epidemiology and Public Health, Yale University School of Medicine, May 1968, 162 pp.

180. *Murnaghan, J. and White, K.L. (ed), Hospital Discharge Data: Report on the Conference on Hospital Discharge Abstracts Systems. Medical Care 8 4: (Supplement), J.B. Lippencott Company, 1970.

181. Murnaghan, J.H. and White, K.L., Hospital Patient Statistics: Problems and Prospects. New England J. Med. 284:822-828, 1971.

182. Myers, R.S. and Slee, N.V., Basic Ingredients of a Medical Audit. Mod. Hos. 86:62-65, April 1956.

183. Myers, R.S. and Slee, V.N., How to Make Length of Stay Make Sense. Mod. Hos. 93:91-99, December 1959.

184. Myers, R.S. and Slee, V.N., Medical Statistics Tell the Story at a Glance. Mod. Hosp. 93:72-75, September 1959.

185. Myers, R.S. et.al., Professional Activity Study. Mod. Hosp. 83:53-64, July 1954.

186. Myers, R.S., Hospital Statistics Don't Tell the Truth. Mod. Hosp. 83: 53-54, July 1954.

187. Myers, R.S., Slee, V.N., and Ament, R.P., Antibiotic Study Shows Need for Therapy Audit in Hospitals. Bull. Amer. Coll. Surg. 48 2:61-63, March-April, 1963.

188. Myers, R.S., Statistical Audits Prove Effective in Improving Medical Standards. Mod. Hosp. 103:124, November 1964.

189. Nahum, L.H., The LINC Takes a History. Connecticut Medicine 30 4:230-233, April 1966.

190. National Center for Health Statistics. Proceedings of the Public Health Conference on Records and Statistics and Study Group Reports of the Public Health Conference. 11th National Meeting, 1966, Public Health Service Publication #1594 and PHCRS Doc. #612.1, Public Health Service, U.S. Department of Health, Education and Welfare.

191. National Center for Health Statistics: Public Health Conference on Records and Statistics. Proceedings, 12th National Meeting, June 1968. Public Health Service Pub. No. 1594, PHCRS Doc. No. 612.1, U.S. Dept. of Health, Education and Welfare (annual).

192. *National Data Communications. Reach System. Dallas, 1969 (Brochure).

193. Neurath, P.W., D.Sc., Enslein, K., and Mitchell, G.W., Jr., M.D., Design of a Computer System to Assist in Differential Preoperative Diagnosis for Pelvic Surgery. The New England Journal of Medicine 280 14:745-749, April 3, 1969.

194. *Newcombe, H.B., Record Linkage and Hospital Discharge Abstracts. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

195. Newcombe, H.B., and Kennedy, J.M., Record Linkage: Making Maximum Use of the Discriminating Power of Identifying Information. Commun. Ass. Computing Machinery 5:563, 1962.

196. Newcombe, H.B., Kennedy, J.M., Axford, S.J., and James, A.P., Automatic Linkage of Vital and Health Records. Science 130:954, 1959.

197. Nitzberg, D.M. and Sardy, H., The Methodology of Computer Linkage of Health and Vital Records. Proceedings, Social Statistics Section. American Statistical Association, 1965, pp. 100-106.

198. *Nitzberg, D.M., ScD., The Basic Neighborhood Health Center Data System. American Journal of Public Health, Volume 61, Number 10, October 1971, (Reprint).

199. *Northeast Ohio Regional Medical Program, Part II, Health Related Data, Section IV, Hospital Discharge Study. Cleveland, no date (all data used for 1967).

200. Nuffield Provincial Hospitals Trust, The Flow of Medical Information in Hospitals. London: Oxford University Press, 1967.

201. *Ontario Hospital Services Commission, Average Length of Stay by Diagnosis for Individual Hospitals in Ontario. Toronto, 1970.

202. *Pallett, P., The Development of a Mechanism for Abstracting Medical Records for Utilization Review. Unpublished Master's Thesis, Medical Care Program, Department of Epidemiology and Public Health, Yale University School of Medicine, May 1969, 219 pp.

203. Payne, R.F., A Computer-Assisted Utilization Review Support System. Rockville: Community Health Service, 1971. (Publ. No. HSM 71-6500), 26 pp.

204. *Peterson, O.L., Information Needs for Regional Planning. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

205. Pratt, A.W. and Thomas, L.B., Information Processing System for Pathology Data. Pathology Annual, 1966. Series Editor: S.C. Sommers, New York: Appleton, 1966.

206. Presco, H.M., and Plein, E.M., MED-REFS – A Study of a Drug Information Service. American Journal of Hospital Pharmacy, pp. 160-167, March 1969.

207. *Ramsay, J.D., The Hospital Discharge Abstract System of Saskatchewan Hospital Services Plan. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

208. Rappoport, A.E., Gennaro, W.D., and Constandse, W.J., Computer-Laboratory Link is Base of Hospital Information System. Med. Hosp. 110 4:94-102, April 1968.

209. Record Linkage: Suggestions Approved by the Society for Social Medicine at the 1968 Annual General Meeting. Brit. J. Prev. Med. 23:203-204, 1969.

210. Record Linking: The Design of Efficient Systems for Linking Records Into Individual and Family Histories. Amer. J. Hum. Genet. 19:335, 1967.

211. Reilly, N.B., Computers in Medicine. Datamation, May 1969.

212. Retrospective Evaluation of Profiles of Hospital Utilization. CPHA (PAS/MAP), The Record, Vol. 5, No. 9, September 18, 1967. 1968 Green Road, Ann Arbor, Michigan 48105.

213. *Richart, R., Evaluation of a Medical Data System. Conference on MIS, San Francisco, January 1970, pp. 27-40.

214. *Robertson, C.M., The Hospital Medical Records Institute. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

215. Robinson, G.H., Davis, L.E., and Leifer, R.P., Prediction of Hospital Length of Stay. Hlth. Serv. Res., 1:287-300, 1966.

216. *Robinson, R.E. III. Acquisition and Analysis of Narrative Medical Record Data. Conference on MIS, San Francisco, January 1970, pp. 111-128.

217. *Rossoff, M.C. and West, H., The Data System for Hospitalized Patients Under Medicare. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

218. *Rowe, B.G., Bonner, P. and Harkins, W., A Proposal for a Centralized Computerized System of Medical Statistics for Connecticut Hospitals. Unpublished students project, Hospital Administration Program, Department of Epidemiology and Public Health, Yale University School of Medicine, May 1967.

219. *Sackett, D.L., Data Requirements of Users of Hospital Discharge Abstracts for Epidemiologic Research. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

220. Schenthal, J.E., Sweeney, J.W., Nettleton, W.J., Jr., and Yoder, R.D., Clinical Application of Electronic Data Processing Apparatus. III. System for Processing of Medical Records. JAMA 186:101-105, 1963.

221. Schwartz, W.B., M.D., Medicine and the Computer, The Promise and Problems of Change. The New England Journal of Medicine 283:1257-1264, December 3, 1970.

222. *Searle Medidata, Inc. Searle Medidata Automated Health Testing Systems. Waltham, 1970. (Brochure)

223. Seibert, S., Shannon, B., Soutter, J.C., and Maronde, R.F., Utilization of Computer Equipment and Techniques in Prescription Processing. Drug Intelligence 1:342, November 1967.

224. Shindell, S., Pittsburgh Plan of Utilization Review. New York J. Med. 22:111, 1968.

225. *Shindell, S., The Hospital Discharge Abstract System in Wisconsin. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

226. *Shindell, S., The Use of Automated Techniques in Aiding Utilization Committees. Presented to annual meeting State Medical Society, Milwaukee, Wisconsin, May 13, 1969.

227. *Sigmond, R.M., Hospital Discharge Abstract Systems and Institutional Planning. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

228. Siler, W., and Korn, H., A Working Total Information System is at Least a Year Away. Hospitals 41, May 1, 1967.

229. Singer, J.P., Hospital Information Systems. San Francisco: Arthur Young & Company, 1968, 90 pp.

230. *Singer, S.J., Visual Display Terminals in a Hospital Information System (HIS). Conference on MIS, San Francisco, January 1970, pp. 129-144.

231. Slack, W.V., et. al., A Computer-Based Medical-History System. The New England Journal of Medicine 274 4:194-198, January 27, 1966.

232. Slack, W.V., Peckham, B.M., and Van Cura, I.J., et.al., Computer-Based Physical Examination System. JAMA 200:224-228, 1967.

233. Slavin, M., Design of an Automated Medication Sub-System. Am. J. Hosp. Pharm. 24:254-261, May 1967.

234. Slee, V.N., and Ament, R., How Much Longer Do Patients Stay in Teaching Hospitals? PAS Reporter 6 (7): June 10, 1968.

235. Slee, V.N., Automation in the Management of Hospital Records. Circ. Res. 11:637-645, 1962.

236. Slee, V.N., How Can You Audit All the Care? Mod. Hosp. 97:71-76, November 1961.

237. Slee, V.N., How To Carry Out Utilization Review and Meet This Requirement of Medicare. PAS Reporter 5:1-4, September 18, 1967.

238. Slee, V.N., Information Systems and Measurement Tools. J. Amer. Med. Assoc. 196 12:1063-1065, June 20, 1966.

239. Slee, V.N., Medical Audit is Best Method of Meeting Utilization Review Need. Mod. Hosp. 105:70-72, 128, December 1965.

240. Slee, V.N., Medical Practice and Statistics. Ariz. Med. 14:193-201, 1957.

241. Slee, V.N., Perlman, J.M., and Schick, D., The Nonoperated Surgical Patient: A Study from PAS and MAP. PAS Reporter 6 (10): December 2, 1968.

242. *Slee, V.N., Professional Activity Study. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

243. Slee, V.N., The Professional Activity Study and the Medical Audit Program. Presented at A.H.A. 70th Annual Meeting, Atlantic City, N.J., September 1968.

244. Smith, P.R., Care Review Mechanisms. Inquiry 2:64-69, September 1965.

245. *Spectra Medical Systems, Inc., $R_X$ For Hospitals in the Seventies. Pala Alto, October 1970. (Brochure)

246. *Sterling, T., and Pollack, S., MEDCOMP, Handbook of Computer Applications in Biology and Medicine. University of Cincinnati, April 15, 1964.

247. *Sturges, J.P., Jr., The Inpatient Discharge Statistics Program. Inquiry 2 2:39-42, September 1965.

248. Summerfield, A.B. and Empey, S., Computer-Based Information Systems for Medicine: A Survey and Brief Discussion of Current Projects. Systems Development Corporation, Santa Monica, California. February 19, 1965, 32 pp.

249. Sunter, A.B., A Statistical Approach to Record Linkage. Record Linkage in Medicine. Edinburgh: E. & S. Livingstone Ltd., 1968, pp. 89-107.

250. Taylor, T.R., The Principles of Medical Computing. Blackwell Scientific Publications, Ltd., Oxford, 1967, 154 pp.

251. Templeton, A.W., Lodwick, G.S. and Turner, A.H., Jr., RADIATE: New Concept for Computer Coding, Transmitting, Storing, and Retrieving Radiological Data. Radiology 85:811-817, 1965.

252. Tepping, B.J., A Model for Optimum Linkage of Records. JAMA 63 324:1321, 1332, December 1968.

253. The Use of Electronic Computers in Medical Data Processing. IRE Trans. on Medical Electronics ME-7:31-47, January 1960.

254. *Thompson, J.D., A Comprehensive Utilization and Patient Information Statistical System. Proceedings: Conference Workshop on Regional Medical Programs, National Institute of Health, Public Health Service Publication No. 1774, United States Department of Health, Education, and Welfare, January 1968.

255. *Thompson, J.D., et.al., Connecticut Utilization and Patient Information System, CUPIS. New Haven: Yale University, Department of Epidemiology and Public Health, 1971. (Unpublished)

256. *Thomson, D.S., The Hospital Discharge Abstract System in British Columbia. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

257. Thoren, B.J., Paulsen, D., and Gould, L.C., Implications for Personnel Adaptation to the Use of Computers in the Patient Care Setting. Hospitals (JAHA) (in press).

258. Turner, A.H., Jr., and Schmidt, D.A. (eds.), Computers in Medicine Bibliography. Department of Radiology and the Medical Center Library, University of Missouri, Columbia, Missouri, August 1966, 230 pp.

259. U.S. Department of Health, Education, and Welfare. Journal References on Hospital Automation. Public Health Service, Division of Hospital and Medical Facilities, Health Facilities Services Branch, Silver Spring, Md., February 1967, 27 pp. Typewritten.

260. U.S. Department of Health, Education, and Welfare. Selected References to Computer Assisted Studies in Biomedical Research. National Institutes of Health, Division of Research Grants, Bethesda, Md. 7 Annual supplements, 1961-1968, 166 pp. Typewritten.

261. *U.S. Department of Health, Education, and Welfare, Summary Report on Hospital Information Systems. National Center for Health Services Research and Development, prepared for Federal Hospital Council. Report No. NCHS-RD-69-1, Springfield, Va., National Technical Information Service, 1969, 37 pp.

262. *U.S. Department of Health, Education, and Welfare, The Use of Computers in Hospitals. Herner and Company. Contract No. PH 110-233, National Center for Health Services Research and Development. Washington, November 1970.

263. *U.S. Department of Health, Education, and Welfare. The Use of Computers in Hospitals. Public Health Service Contract No. PH 110-233. Washington, D.C. Government Printing Office. n.d., 1968, 130 pp.

264. U.S. Veterans Administration. General Description of the Veterans Administration Pilot Automated Hospital Information System (AHIS) Veterans Administration, Washington, D.C. Revised April 1969, 19 pp. Typewritten.

265. *Utilization Review – Appendix E. State Operations Manual HIM-1. U.S. Department of Health, Education, and Welfare. Social Security Administration, July 1970.

266. Van Brunt, E.E., Collen, M.F., Davis, L.S., Besag, F., Singer, S.J., A Pilot Data System for a Medical Center. Proc. IEEE 57:1934-1940, 1969.

267. Vital and Health Statistics Series. Patients Discharged from Short-Stay Hospitals. U.S. Department of Health, Education, and Welfare, HSMHA, Washington, December 1968.

268. Warner, H., High Density Data for Medical Information Systems Records. Conference on MIS, San Francisco, January 1970.

269. Weckwerth, V.E., How to Use and Misuse Average Length of Stay Data. Mod. Hosp. 105:114-117, 176, October 1965.

270. Weckwerth, V.E., On Evaluation: A Tool or a Tyranny II. Systems Development Projects Comment Series (1510). Program in Hospital and Health Care Administration, University of Minnesota, 1967.

271. *Weckwerth, V.E., The Conceptual Model for Reporting in Children and Youth Projects. No. 9-11 (23), University of Minnesota, Systems Development Project, Comment Series, Minneapolis, Minnesota Systems Research, Inc. (mimeographed – 2408 University Avenue SE, Minneapolis, Minnesota 55414).

272. Weil, M.H., Shubin, H., and Rand, W., Experience with Digital Computer For Study and Improved Management of Critically Ill. JAMA 198:1011-1016, 1966.

273. *Weinerman, E.R., et.al., A System of Records and Statistics for Out-Patient Clinics as a Basis for Administration and Research. Report to Division of Medical Care Administration, Public Health Service. Contract No. PH 108-65-56, December 1967.

274. Whitby, L.G., Lutz, W., Principles and Practice of Medical Computing. London, Churchill Livingstone, 1971.

275. *White, K., et.al., Proceedings of Ambulatory Medical Care Records Conference, Chicago, April 1972.

276. White, K., Improved Medical Care Statistics and the Health Services System. Public Health Rep. 82 10:847-854, October 1967.

277. Williams, K.J., The Professional Activities Study and Your Hospital. Canad. Hosp. 41:36-39, December 1964.

278. *Wilson, W.A., Hospital In-Patient Enquiry for England and Wales. Medical Care, Vol. VIII, No. 4, Supplement; July-August 1970.

279. *Wolfe, H., A Computerized Screening Device for Selecting Cases for Utilization Review. Medical Care 5 1:44-51, January-February 1967.

280. Woodward, R., Gomez, A., Steinhardt, B., and Jonas, S., Data Systems for Medicare (Utilization Review). Unpublished student project, Hospital Administration Program, Department of Epidemiology and Public Health, Yale University School of Medicine, May 1966.

281. Woolsey, T.D., Data Banks are Not the Answer: A Statistician's Viewpoint. AJPH, 60 10:1991-1995, October 1970.

282. Yoder, R.D., Preparing Medical Record Data For Computer-Processing. Hospitals 40:75, 1966.

283. Young, R., Techniques of Case Selection in a Community-Based Utilization Review Program. Unpublished Master's thesis, Hospital Administration Program, Department of Epidemiology and Public Health, Yale University School of Medicine, May 1969, 182 pp.

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